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MONOGRAPH

OF THE

ASIATIC CHIROPTERA.

MONOGRAPH

OF THE

ASIATIC CHIROPTERA,

AND

CATALOGUE OF THE SPECIES OF BATS

IN THE COLLECTION OF

THE INDIAN MUSEUM,

CALCUTTA.

BY

G. E. DOBSON, M.A., M.B., F.L.S., &c.

LONDON:
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OF THE
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1876.

ALERE FLAMMAM.

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PREFACE.

THE completion of this short work, commenced in 1871, in Calcutta, has for many reasons been delayed. I had at first determined to write a descriptive catalogue of the species of Bats preserved in the Indian Museum; but finding, on finishing my examination of the collection, that few species remained to fill up the list of Asiatic Chiroptera, I resolved to add the descriptions of these species, and so unite to the Catalogue of the Species of Bats a Monograph of the Asiatic Chiroptera.

The MSS., thus commenced in 1871, remained without further addition until 1874; for almost constant interruptions to the progress of even this short work occurred, chief among them my return to England. I was therefore unable to resume work until last year, when the prospect of a visit to the Continent for the purpose of examining the types preserved in the Museums of Berlin, Leyden, and Paris especially, and the hope of soon obtaining an opportunity for seeing the types of Horsfield's Bats from Java, made me delay publication still further.

As now completed, this monograph contains full descriptions of all the species of Chiroptera known, with certainty, to occur within the limits of Asia, and includes also a list of the specimens of Bats in the collection of the Indian Museum. Moreover, as all the European Bats, with the exception of four species, have been found inhabiting Asia also, I have added full descriptions of these four, in footnotes to the species with which they are most nearly allied. This work might therefore be justly entitled "A Monograph of the Asiatic and European Chiroptera."

The limits of Asia, as understood in this work, are, on all sides except the Malayan, the ordinary geographical limits as laid down, for instance, in Keith Johnston's last edition of his School Atlas. On the Malayan side, the boundary-line between the Indo-Malayan and Austro-Malayan regions (as defined in the physical map at p. 14 of Wallace's 'Malay Archipelago') has been taken, thus including within the S.E. limits of Asia the islands of Sumatra, Java, Bali, Borneo, and the Philippines.

The total number of species described is 122; and of these 87 are either peculiar to Asia or have not yet been found in any of the other divisions of the earth.

The descriptions (of the species of *Vespertilionidæ* especially) are long, and may appear at first sight unnecessarily so; but when ill-preserved specimens of species of this family (always difficult to determine even in the best condition) are examined, even with the additional assistance given by the analytical table under the definition of each genus, it will be found that, in many cases I fear, the descriptions are not sufficiently extended. In most skins of Bats so great is the distortion resulting from the drying-process necessary to preserve them, that one of the chief guides in determining the species will be found in the distribution of the fur, which often varies very considerably among species of the same subgenus, contrasting in this respect remarkably with the *Rhinolophidæ*, in which a description of the distribution of the fur in a single species will almost serve for the whole family. On the other hand, the leaf-nosed Bat carries, as it were, his own "coat of arms" in the shape of the remarkable cutaneous nasal appendages, which vary in form, however slightly, in different species. Again, in the *Emballonuridæ*, the presence of peculiar glandular apparatus, in most species, differing in the sexes, renders the determination of species comparatively easy. In the *Pteropidæ* and in the *Vespertilionidæ*, however, no such aids exist; and the difficulty of writing descriptions of the species of these families by which they can be recognised with certainty is very great. Accurate descriptions of the form of the ear, of the dentition, of the distribution of the fur, accompanied by careful measurements, are requisite, and cannot be written in few words.

With very few exceptions, the descriptions are original, and have either been taken by me from the types directly, or from well-preserved specimens which I had compared with the types. This has necessitated the examination of many large collections in addition to that in the Indian Museum; and for opportunities afforded to me for carrying it out, I desire here to record my especial obligations to Dr. Günther, F.R.S., Keeper of the Zoological Collections, British Museum; to Prof. W. H. Flower, F.R.S., Hunterian Museum, R.C.S.; to Mr. F. Moore, of the Indian Museum; to Mr. T. J. Moore, of the Liverpool Museum; to Prof. Macalister, Director of the Museum of Trinity College, Dublin; and to Sir Walter Elliot, who most kindly forwarded for my examination from Scotland the valuable collection of Bats made by him in the Madras Presidency, and described in his 'Catalogue of the Mammals of the South Mahratta Country.' On the Continent, Professors Peters, Milne-Edwards, and Schlegel, of the Berlin, Paris, and Leyden Museums, have most kindly afforded me full opportunities for examining the extensive collections in their care; and to Prof. Peters (whose contributions to our knowledge of the Chiroptera are so well known) my special thanks are due for valuable assistance at all times willingly given.

To the great liberality of the late Dr. F. Stoliczka I owe the use of many of the specimens from which the original descriptions have been made by me; and I have to acknowledge especially the kindness with which Mr. Francis Day, Inspector-General of Indian Fisheries, Major H. H. Godwin-Austen, Mr. W. T. Blanford and Mr. W. Theobald, of the Geological Survey, Mr. Homfray, Assistant-Superintendent, Port Blair, and Dr. Anderson and Mr. Wood-Mason have placed their private collections at my disposal.

Lastly, for aid given me in a different, but in by far the most important direction, my best thanks are due to Sir W. M. Muir, K.C.B., Director-General of the Army Medical Department, who has afforded me, both in India and in England, opportunities for continuing my zoological studies, without which this short work could never have even been commenced.

G. E. DOBSON.

Royal Victoria Hospital,
Netley,
1st December, 1875.

NOTE.—The woodcuts, one hundred in number, which illustrate the following pages, have all been executed from drawings made in Calcutta by native artists, pupils of the Government School of Art.

A few have been employed to illustrate some of my papers on Chiroptera; and Dr. P. L. Sclater, F.R.S., has kindly obtained for me permission from the Council of the Zoological Society of London to make use of the ten wood-blocks from which the illustrations in my paper "On Secondary Sexual Characters in Chiroptera" were printed.

By far the greater number of the engravings, however, are original, and represent new or little-known species; and, as the drawings have been made under my direct and constant superintendence, I can testify to their correctness.

G. E. D.

ADDENDA ET CORRIGENDA.

Page 37, *for* "First toe with three, remaining toes with two, joints each," *read* "First toe with two, remaining toes with three joints each."

Page 40, line 40, *add* "India (Western Ghâts): Borneo."

Page 47, *to* list of synonyms of *Rhinolophus affinis, add* "*Rhinolophus rubidus et cineraceus,*" Kelaart, Prodr. Faunæ Zelan, page 13, (1852).

Page 53, line 29, *for* "Isagine," *read* "Tsagain."

Page 65, line 35, *for* "Mussoree," *read* "Masuri."

Page 70, *to* line 14 from bottom, *add* "Sarawak."

Page 71, *to* list of synonyms of *Phyllorhina fulva, add* "*Hipposideros cineraceus,*" Blyth, J. A. S. B., xxii, page 410.

Page 72, line 3, *for* "Ponsee and Kakyan Hills," *read* "Ponsee, Kakhyen Hills;" *for* "Isagine, Sagain Hills," *read* "Tsagain and Tsagain Hills."

Page 72, line 29, *for* "Isagine," *read* "Tsagain."

Page 79, *to* list of synonyms of *Megaderma spasma, add* "*Megaderma horsfieldii,*" Blyth, Catal. Mamm. Mus. As. Soc. Beng., page 23 (1863).

Page 91, line 15 from bottom, *add* after word "Azores," "and Ireland."

Page 94, *to* list of synonyms of *Vesperugo Kuhlii, add* "*Scotophilus rusticus,* Tomes, P. Z. S., 1861, page 35.

Page 97, *to* list of synonyms of *V. abramus, add* "*Vespertilio akokumuli,* Temm. Monog. Mamm. ii, page 223; *Scotophilus pumiloides,* Tomes, P. Z. S., 1857, page 51; *Vesperugo micropus,* Hutton, Peters, P. Z. S., 1872, page 708.

Page 103, line 11, *for* "4,500 feet at Bhamo, Yunan," *read* "450 feet, Bhamo, Upper Burma."

Page 103, line 15, *for* "Bhamo, Yunan," *read* "Bhamo, Upper Burma."

Page 125, line 48, *for* "Ponsee and Kakhyan Hills," *read* "Ponsee, Kakhyen Hills."

Page 132, include *Vespertilio daubentonii* in the Asiatic Fauna, adding its habitat "Altai Mountains."

Page 136, under "Hab.," *add* "Chutia-Nagpur."

Page 178, line 4, *for* "interior" *read* "anterior."

Page 178, line 35, *for* "head 1". 6, ear 1". 8, *read* "head 1". 8, ear 1". 2.

Page 180, *to* "list of synonyms of *Nyctinomus cestonii*" *add* "*Dysopes midas,* Sundevall, Stockh. Vetensk., Akad., Handl., 1842, page 207.

Page 196, No. 182*a*, *for* "Isagine," *read* "Tsagain."

Page 196, No. 189*a*, *for* "Isagine," *read* "Tsagain."

Page 200, No. 720, *for* "Durrany," *read* "Durrang."

Page 200, No. 272*a*, *for* "Isagine," *read* "Tsagain."

Page 204, No. 372*a*, *for* "Isagine," *read* "Tsagain."

Page 208, No. 473, *for* "Mur" *read* "Mir."

Page 214, No. 629, *for* "*V. Kuhlii,* Natt. var. *affinis,* Dobson," *read* "*Vesperugo affinis,* Dobson (type)," and *for* "Yunan," *read* "Upper Burma."

Page 216, No. 631, *for* "*Vesperugo Kuhlii,*" *read* "*Vesperugo maurus* Blas. (type of *Vesperugo austenianus* Dobson.")

Page 216, No. 632, *for* "*V. akokumuli,*" *read* "*Vesperugo abramus,* Temm.

Page 218, No. 667, *for* "*V. blanfordi,*" Dobson, *read* "*Vespertilio muricola,* Gray, var. *blanfordi,* Dobson."

Page 220, No. 720, *for* "Durrany," *read* "Durrang."

Page 314, No. 735, *for* "Durrany," *read* "Durrang."

Order CHIROPTERA.

Volant mammals, with thoracic postaxillary mammæ, a simple or two-horned sternum and smooth cerebral hemispheres not extending backwards over the cerebellum. The fore limbs are specially modified for flight; the forearm consists of a rudimentary ulna, a long curved radius, and a carpus of six bones supporting a thumb and four greatly elongated fingers, between which a thin expansion of the integument (*the wing-membrane*) is spread out. The knee is directed backwards, owing to the rotation of the hind limb outwards by the wing-membrane; a peculiar elongated cartilaginous process (*the calcaneum*), arising from the ankle-joint, is directed inwards, and supports part of the posterior margin of an accessory membrane of flight, extending from the tail or posterior extremity of the body to the hinder limbs (*the interfemoral membrane*).

The dental series consists of four kinds of teeth—incisors, canines, premolars, and molars; and the dental formula never exceeds,

$$\text{Inc.}\ \tfrac{4}{6},\ \text{c.}\ \tfrac{1-1}{1-1},\ \text{pm.}\ \tfrac{3-3}{3-3},\ \text{m.}\ \tfrac{3-3}{3-3},\ =38\ \text{teeth.}$$

Suborder I. MEGACHIROPTERA.

Chiroptera frugivora *auct.*

Crowns of the molar teeth smooth, marked with a longitudinal furrow; bony palate continued behind the last molar, narrowing slowly backwards; index finger* generally terminating in a claw; sides of the ear-conch forming a complete ring at the base; *pyloric* extremity of the stomach greatly elongated.

Frugivorous.

Limited to the tropical and subtropical regions of the eastern hemisphere and Polynesia.

Suborder II. MICROCHIROPTERA.

Chiroptera insectivora *auct.*

Crowns of the molar teeth acutely tubercular, marked by transverse furrows; bony palate narrowing abruptly, not continued laterally behind the last molar; index finger not terminated by a claw; outer and inner sides of the ear-conch commencing anteriorly from separate points of origin; stomach simple, or with the *cardiac* extremity more or less elongated†.

Carnivorous, feeding principally upon insects‡.

Inhabiting the tropical and temperate regions of both hemispheres‖.

* The term "index finger" is used to prevent the confusion which might arise if the expression "first finger," which is applied by some zoologists to the "thumb," were employed instead.

† Immensely elongated in *Desmodus*.

‡ Some species of Phyllostomidæ, especially the species of the group *Stenodermata*, have been shown to be frugivorous; but they are probably carnivorous also. In form their teeth in no respect resemble those of *Megachiroptera*; but the true molars, in their narrow external cutting-edges, resemble those of Carnivora, even more so than those of the truly insectivorous species with their W-formed cusps.

‖ The Chiroptera fall naturally into the two Suborders defined above, hitherto known as *Chiroptera frugivora* and *Chiroptera insectivora*; but, as those names have not been framed in accordance with the accepted rules of zoological nomenclature, and as, moreover, the second part of the name of the second suborder has been previously applied to an Order of Mammals, I have used here instead the terms *Megachiroptera* and *Microchiroptera* to express these divisions respectively. These terms are relatively correct; for, although some species of the Carnivorous Bats very much exceed in size many species of the Frugivorous, nevertheless the Frugivorous Bats, taken collectively, are very much larger than the Carnivorous, contrasting with them in size almost to the same extent as, among other Mammals, the Ungulata contrast with the Carnivora.

Suborder I. **MEGACHIROPTERA.**

Family I. **Pteropidæ.**

Synopsis of Groups of Allied Genera.

A. Tongue moderate; molars well developed. Group 1. PTEROPI.
(*Pteropus*, Brisson; *Cynopterus*, F. Cuvier; *Cynonycteris*, Peters; *Harpyia*, Illiger; *Epomophorus*, Bennett; *Cephalotes*, Geoff.)

B. Tongue very long; molars weak, scarcely elevated above the gum ..... Group 2. MACROGLOSSI.
(*Macroglossus*, F. Cuvier; *Eonycteris*, Dobson; *Notopteris*, Gray.)

Suborder II. **MICROCHIROPTERA.**

Analytical Table of Natural Families.

A. Tail contained within the interfemoral membrane.

a. Middle finger with two phalanges *.

a'. First phalanx of the middle finger extended (in repose) in a line with the metacarpal bone.

a''. Nostrils opening in a depression on the upper surface of the muzzle, surrounded by foliaceous cutaneous appendages.

a'''. Tragus none; premaxillary bones rudimentary, represented by thin osseous laminæ suspended from the nasal cartilages in the centre of the space between the canines..... **Rhinolophidæ.**

b'''. Tragus distinct; premaxillary bones cartilaginous or small, separated by a space in front. **Nycteridæ†.**

b''. Nostrils opening by simple crescentic or circular apertures at the extremity of the muzzle, not surrounded by distinct foliaceous cutaneous appendages ‡; premaxillary bones small, lateral, separated by a wide space in front; tragus distinct ..... **Vespertilionidæ.**

B. Tail perforating the interfemoral membrane and appearing on its upper surface, or produced considerably beyond the truncated membrane §.

b'. First phalanx of the middle finger folded (in repose) on the dorsal surface of the metacarpal bone ‖.

* Except in *Thyroptera tricolor* and in *Mystacina tuberculata*.
† Nycteridæ=Megadermata, Peters (in part), *l. c.*
‡ A rudimentary nose-leaf in *Nyctophilus* and in *Antrozous*.
§ In *Macrotus*, *Macrophyllum*, and *Lonchorina* alone the tail is contained in the interfemoral membrane.
‖ Except in *Noctilio* and in *Mystacina*.

c''. Nostrils opening by simple circular or valvular apertures, not surrounded by foliaceous cutaneous appendages; tragus distinct ..... **Emballonuridæ***.

b. Middle finger with three phalanges; first phalanx of the middle finger short; nostrils in the front part of the cutaneous nasal appendages, or opening by simple apertures at the extremity of the muzzle; chin with warts or erect cutaneous ridges; premaxillary bones well developed, united in front. **Phyllostomidæ.**

Synopsis of Subfamilies.

Rhinolophidæ.

I. Toes unequal, first toe with two, remaining toes with three phalanges each; ilio-pectineal spine not connected by bone with the antero-inferior surface of the ilium.. **Rhinolophinæ.**

II. Toes equal, of two phalanges each; ilio-pectineal spine united by a bony isthmus with a process derived from the antero-inferior surface of the ilium, forming a large preacetabular foramen ..... **Phyllorhininæ.**

Nycteridæ.

I. Nostrils at the bottom of a concavity on the extremity of the muzzle, concealed by the base of an erect cutaneous process; tail very short, in the base of the large interfemoral membrane; premaxillaries cartilaginous ..... **Megadermінæ.**

II. Nostrils at the anterior extremity of a deep longitudinal facial groove; tail long, produced to the hinder margin of the interfemoral membrane ..... **Nycterinæ.**

Vespertilionidæ.

Not divisible into subfamilies.

Emballonuridæ.

I. Tail slender, perforating the interfemoral membrane and appearing upon its upper surface; legs long, fibula very slender; premaxillary bones generally separated by an interval in front; incisors weak ..... **Emballonurinæ.**

II. Tail thick, produced considerably beyond the short interfemoral membrane †; legs very short and stout; fibula well developed; premaxillary bones close together in front or united; upper incisors strong ..... **Molossinæ** ‡.

* Emballonuridæ = Brachyura et Molossi, Peters, *l. c.*

† Except in *Mystacina tuberculata.*

‡ These subfamilies nearly correspond to the families Brachyura and Molossi of Peters, and to the Vespertilionidæ (in part) and Noctilionidæ of Gray. The genera of Emballonuridæ, however, with the exception of *Rhinopoma* and *Noctilio*, are so connected that any attempt to divide them into subfamilies must be very artificial. The genera fall naturally into six groups, which I shall define further on.

Phyllostomidæ.

I. Nostrils on the upper surface of the muzzle, surrounded by cutaneous appendages; chin with warts .... **Phyllostominæ.**

II. Nostrils in the front of the muzzle, opening by simple apertures near the margin of the upper lip; chin with erect cutaneous ridges ..... **Lobostominæ.**

Synopsis of Groups of Allied Genera.

	Genera.
Fam. Rhinolophidæ.	
Subfam. **Phyllorhininæ**	*Cœlops*, Blyth. *Phyllorhina*, Bonap. *Rhinonycteris*, Gray. *Triænops*, Dobson.
Subfam. **Rhinolophinæ**	*Rhinolophus*, Geoffr.
Fam. Nycteridæ.	
Subfam. **Nycterinæ**	*Nycteris*, Geoffr.
Subfam. **Megadermina**	*Megaderma*, Geoffr.
Fam. Vespertilionidæ.	
A. Crown of the head flat or slightly raised above the face-line; upper incisors close to canines.	
a. Ears very large, generally united. Group PLECOTI	*Antrozous*, Allen. *Nyctophilus*, Leach. *Otonycteris*, Peters. *Corinorhinus*, Allen. *Plecotus*, Geoffr. *Synotus*, Keys. & Blas. *Histiotus*, Gervais.
b. Ears moderate, separate. Group VESPERTILIONES	*Vesperugo*, Keys. & Blas. *Chalinolobus*, Peters. *Scotophilus*, Leach. *Nycticejus*, Rafinesque. *Atalapha*, Rafinesque. *Murina*, Gray. *Vespertilio*, Keys. & Blas. *Kerivoula*, Gray.
B. Crown of the head greatly elevated above the face-line; upper incisors separated from the canines, and also in front. Group MINIOPTERI	*Natalus*, Gray. *Thyroptera*, Spix. *Miniopterus*, Bonap.
Fam. Emballonuridæ.	
Subfam. **Emballonurinæ.**	
A. First phalanx of the middle finger folded (in repose) on the dorsal surface of the metacarpal bone; upper incisors weak.	
a. Frontal bones convex. Group 1. EMBALLONURÆ	*Furia*, F. Cuvier. *Saccopteryx*, Illiger. *Rhynchonycteris*, Peters. *Emballonura*, Temm.

b. Frontal bones with a distinct concavity.
a'. Premaxillary bones separate in front.
Group 2. TAPHOZOI ..... *Colëura*, Peters. *Taphozous*, Geoffr. *Diclidurus*, Wied.

b'. Premaxillary bones united.
Group 3. RHINOPOMATA .... *Rhinopoma*, Geoffr.

B. First phalanx of the middle finger extended (in repose) in a line with the metacarpal bone; upper incisors strong.
Group 4. NOCTILIONES .... *Noctilio*, L.

Subfam. **Molossinæ.**

C. First phalanx of the middle finger folded (in repose) on the dorsal surface of the metacarpal bone; upper incisors large, well developed.
Group 5. MOLOSSI ..... *Mormopterus*, Peters. *Molossus*, Geoffr. *Nyctinomus*, Geoffr. *Cheiromeles*, Horsf.

D. First phalanx of the middle finger folded (in repose) on the inferior surface of the metacarpal bone; tail perforating the interfemoral membrane; upper incisors strong, well developed.
Group 6. MYSTACINÆ ..... *Mystacina*, Gray.

Fam. **Phyllostomidæ.**

Subfam. **Lobostominæ.**

Group 1. MORMOPES ..... *Chilonycteris*, Gray. *Pteronotus*, Gray. *Mormops*, Leach.

Subfam. **Phyllostominæ.**

A. True molars present; upper incisors 4.
a. Muzzle long; outer side of true molars with W-formed cusps.
a'. Tongue moderately long, terminating in an obtuse tip; upper surface of the lower lip not divided in the centre.
Group 2. VAMPYRI ..... *Macrotus*, Gray. *Lonchorhina*, Tomes. *Macrophyllum*, Gray. *Vampyrus*, Geoffr. *Schizostoma*, Gervais. *Lophostoma*, D'Orb. *Trachyops*, Gray. *Phyllostoma*, Peters. *Carollia*, Gray. *Rhinophylla*, Peters.

b'. Tongue very long, much attenuated towards the tip; upper surface of the lower lip divided by a deep groove in the centre.
Group 3. GLOSSOPHAGÆ .... *Glossophaga*, Pall. *Monophyllus*, Leach. *Ischnoglossa*, Sauss. *Phyllonycteris*, Gundl. *Lonchoglossa*, Peters. *Glossonycteris*, Peters.

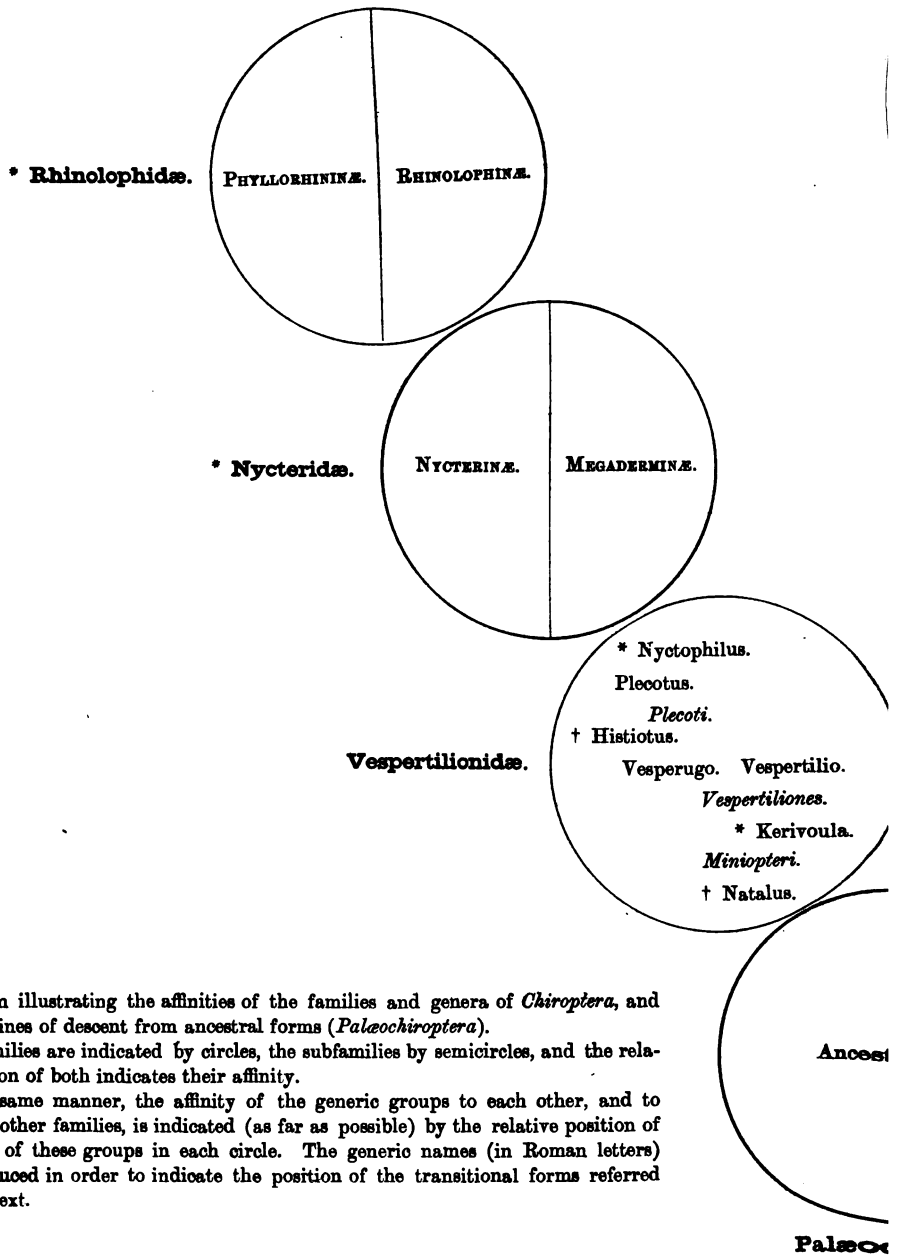
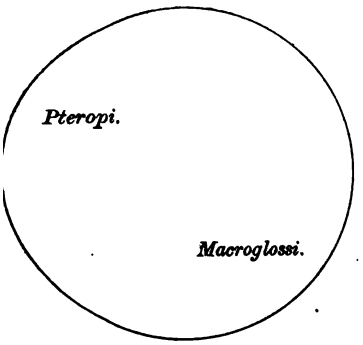


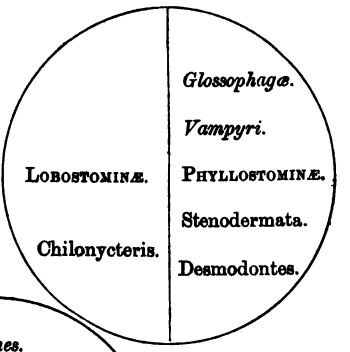
Diagram illustrating the affinities of the families and genera of *Chiroptera*, and probable lines of descent from ancestral forms (*Palæochiroptera*).

The families are indicated by circles, the subfamilies by semicircles, and the relative position of both indicates their affinity.

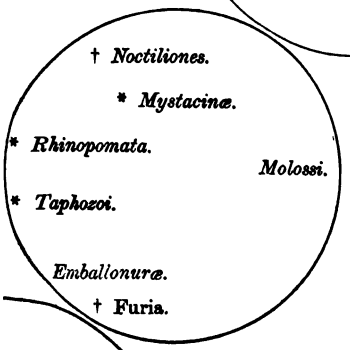
In the same manner, the affinity of the generic groups to each other, and to groups of other families, is indicated (as far as possible) by the relative position of the names of these groups in each circle. The generic names (in Roman letters) are introduced in order to indicate the position of the transitional forms referred to in the text.



Pteropidæ.**



Phyllostomidæ.†



Emballonuridæ.

* Limited to the Eastern Hemisphere.

† Limited to America.

** Limited to the Eastern Hemisphere and Polynesia.

Families, groups, and genera not distinguished by a mark, as above, are found in both hemispheres.

The position of the circle representing the *Pteropidæ* is not intended (as in other cases) to indicate their descent from the *Phyllostomidæ*, but to show their position with regard to the whole suborder *Microchiroptera*.

b. Muzzle short, broad and obtuse; outer side of true molars with a notched cutting-edge.	Group 4. STENODERMATA	*Artibeus*, Leach. *Phyllops*, Peters. *Vampyrops*, Peters. *Stenoderma*, Geoffr. *Pygoderma*, Peters. *Ametrida*, Gray. *Chiroderma*, Peters. *Sturnira*, Gray. *Brachyphylla*, Gray. *Centurio*, Gray.
B. No true molars; upper incisors 2.	Group 5. DESMODONTES.....	*Desmodus*, Wied. *Diphylla*, Spix.

In the accompanying Diagram I have represented the families of Microchiroptera diverging along two distinct lines of descent from some ancestral group now extinct, which I have for convenience designated Palæochiroptera. These allied families form two natural alliances, which may be called the Vespertilionine and Emballonurine alliances respectively; and these alliances correspond very closely to their geographical distribution, to which I shall refer particularly hereafter.

The Vespertilionidæ and Emballonuridæ are evidently connected through the genera included in the groups Miniopteri and Emballonuræ, more particularly by the genera *Natalus* and *Furia*—not directly, however, but most probably through the family or group, now extinct, referred to above.

THE VESPERTILIONINE ALLIANCE.

(Vespertilionidæ, Nycteridæ, Rhinolophidæ.)

Analysis of Natural Affinities.

In some specimens of *Plecotus auritus* the glands on the sides of the muzzle, between the nostrils and the eyes, form rounded prominences, rising slightly above the margins of the naked crescentic depressions behind the nostrils. These prominences in a closely allied genus (*Corinorhinus*) are greatly developed vertically, forming high conical processes on the sides of the face, which processes, bending inwards over the nasal grooves, meet in the centre above and behind the nostrils, concealing the grooves beneath. In front the nasal apertures are margined by a small horizontal cutaneous ring. In *Nyctophilus* (which is closely connected with *Plecotus* and *Synotus*) the same prominent glands of the muzzle have become united in the centre above the nasal grooves (evidence of their distinct origin being given by the presence of a longitudinal furrow above); while the cutaneous marginal rings surrounding the nasal apertures in *Corinorhinus* have become expanded and also united behind, forming a small nose-leaf, which is supported behind by the united glandular prominences*.

* In a similar manner, most probably, the nasal appendages in all genera of Chiroptera with nose-leaves have been developed.

In the much more highly differentiated nasal processes of *Megaderma*, especially in *M. spasma*, the homologies of these parts with the glandular prominences and rudimentary nose-leaf of *Nyctophilus* will be readily recognized. But *Megaderma* shows its affinities to the Rhinolophidæ in the peculiar pubic appendages and in the form of the wings and ears—indeed, by many zoologists has been placed in that family; and the very complicated nasal appendages of *Rhinolophus* are evidently but differentiated forms of the simpler nose-leaves of *Nyctophilus* and of *Megaderma**.

Thus the intimate connexion of the genera of the three families constituting what I have called the Vespertilionine alliance can be traced through *Plecotus*, *Nyctophilus*, and *Megaderma*; and this view of their relations is still further strengthened by an examination of the minute structure of the hairs composing the fur, which will be found to agree in a very remarkable manner in these families, and to differ not less remarkably from that in the allied genera united in what I have termed

The Emballonurine Alliance.

(Emballonuridæ, Phyllostomidæ.)

Analysis of Natural Affinities.

The Vespertilionidæ are connected with the Emballonuridæ by *Miniopterus*, which agrees with all the genera in the shortness of the first phalanx of the middle finger, and with the genus *Furia* in the great elevation of the crown of the head, in the position and form of the upper incisors, and in the tail, which ends *in* the interfemoral membrane, not even the extreme tip projecting. *Natalus* also resembles *Furia* closely in the very short thumb, in the peculiar form of the tragus, and in the tenuity and venation of the membranes.

The very peculiar genus *Rhinopoma*, which I have placed in a separate group, is connected apparently more closely with *Taphozous* than with any other genus. The very long tail, produced nearly double its length beyond the short truncated interfemoral membrane, really perforates the membrane (as in other species of the subfamily Emballonuridæ) near its posterior margin; and the short first phalanx of the middle finger is imperfectly flexed upon the dorsal surface of the metacarpal bone, as in *Furia*—thus also agreeing with all other species of this subfamily except *Noctilio*. If *Rhinopoma hardwickii* and *Taphozous nudiventris*, which inhabit the same regions, be compared, the general resemblance of these generically very distinct forms is sufficiently evident. Both agree in the frontal depression between the eyes, in the *quality and distribution of the fur*, in the

* *Nyctophilus* is much more closely related to *Plecotus* than to *Megaderma* or to *Nycteris*. This is shown by the skull, which, when compared with that of *Plecotus*, presents differences which would scarcely warrant generic separation if taken alone. Prof. Peters has pointed out the affinities of *Antrozous* with *Nyctophilus*, the skulls and skeletons of which scarcely differ. Consequently *Antrozous* cannot be placed among the Nycteridæ, though differing from all genera of Vespertilionidæ in possessing four lower incisors only.

great deposits of fat about the base of the tail; while *Rhinopoma* agrees generally with the genus *Taphozous* in the form of the foot and in the presence of a few scattered long hairs near the extremity of the tail. This last-named character may appear to be a superficial one; but I consider it very indicative of affinity. The position of this very curious genus (which differs from all the Microchiroptera in possessing two distinct phalanges in the index finger, as in the Megachiroptera) among the Emballonuridæ is further shown by the microscopical characters of the fur, in which it agrees with that family and with the Phyllostomidæ, and differs from all species of the Vespertilionine alliance. The presence of a small nose-leaf, the longitudinal fissure on the muzzle, the shortness of the middle finger, and the existence of a pair of abdominal (not pubic) appendages (like those in *Megaderma*, but smaller) connect this remarkable genus with the Nycteridæ.

Mystacina, represented by *M. tuberculata* (Gray), Tomes, from New Zealand, connects the *Emballonurinæ* with the *Molossinæ*. It possesses characters common to both subfamilies, resembling the species of the first in the form of the ears and in the short tail perforating the interfemoral membrane, the second in dentition and in the general form of the body; so that its position is clearly among the *Molossinæ*. Unlike the other genera of Emballonuridæ, the middle finger has three phalanges, as in *Thyroptera* among the Vespertilionidæ, and the first phalanx is flexed downwards upon the metacarpal bone.

Noctilio connects the Emballonuridæ, especially the subfamily *Emballonurinæ*, with the Phyllostomidæ through the *Lobostominæ*. I have placed *Noctilio* provisionally in this family; for its affinities appear to me to be with *Chilonycteris* and the genera allied thereto. These affinities are shown by the presence of a small incisor on each side external to the large central upper incisors, by the development of the mastoid and paroccipital processes, by the short first phalanx of the middle finger, which is not flexed upwards (in repose) on the dorsal surface of the metacarpal bone (as in other species of Emballonuridæ), and by the erect cutaneous ridges on the chin, and especially by the form of the nostrils and ears and by the microscopical characters of the fur.

The Phyllostomidæ are divisible into two subfamilies, the *Lobostominæ* and the *Phyllostominæ*:—the first containing the genera *Chilonycteris*, *Pteronotus*, and *Mormops*, united by Prof. Peters into a group *Mormopes*; the second the remaining genera of the family. If the genus *Noctilio* were placed among the *Lobostominæ*, it would form a separate group distinguished by the presence of two phalanges only in the middle finger.

I have followed Prof. Peters's divisions of the genera of *Phyllostominæ*, retaining his names of subfamilies for what I consider groups of allied genera*. Between these groups transitional forms exist,

* Prof. Peters has devoted so much attention to the Phyllostomidæ, and his knowledge of the species of this family is so profound, that I hesitate to make any change in his system of grouping the genera.

which have not yet been found between the *Phyllostominæ* and the *Lobostominæ*. Thus *Rhinophylla* leads from the *Vampyri* to the *Glossophagæ*; and the close connexion of the *Vampyri* with the *Stenodermata* is seen in the similarity of the warts of the lower lip. *Brachyphylla* is evidently so closely related to *Desmodus* that it appears difficult to regard these genera, though differing so widely in dentition, as belonging to different groups; yet *Desmodus* has been considered the type of a primary division of the Chiroptera.

Megachiroptera.

Pteropidæ.

Analysis of Natural Affinities.

The natural affinities of these Bats with any of the families of Microchiroptera is not easily traced. Some zoologists consider that they form but another family of Chiroptera and cannot be separated into a distinct suborder, and support their opinion by enumerating the many points of agreement in structure between *Macroglossus* and the species of the group *Glossophagæ* of Phyllostomidæ. But, in the form of the wings, and even in the microscopic characters of the fur, the Pteropidæ are also connected with the families of the Vespertilionine alliance; while they differ altogether (as described in the definition of the suborder) from the Microchiroptera in the general form of the ear-conch, of the teeth, and of the bony palate—also in the tail being inferior to the interfemoral membrane, not contained in it or appearing on its upper surface as in all other families of Chiroptera. These very different natural characters lead me to trace the descent of the Pteropidæ from a group of Palæochiroptera distinct from that from which the Vespertilionine and Emballonurine alliances have sprung, but with affinities to that section of the latter group from which the Emballonuridæ are derived. Thus the connexion of the Pteropidæ with the Emballonurine alliance has left traces in the index finger of *Rhinopoma* with two distinct bony phalanges (found in no other genus of Microchiroptera), in the very large and peculiarly shaped feet of *Noctilio* and in the form of its wings, in the well-developed premaxillary bones and upper incisors of Phyllostomidæ generally, and particularly in the long tongue and muzzle and feeble molars of the *Glossophagæ*, and in the frugivorous or semi-frugivorous habits of some species of this family.

It is not, however, in the agreement of certain characters (which may have resulted from similar adaptative causes) that we should seek for proof of special affinity, but in the general agreement of all the natural characters considered together; and it would be, in my opinion, as unphilosophical to consider the Heaths and Campanulas (to take an example from the vegetable kingdom) united in one order because they agree in the insertion of the stamens, or, conversely, to distinguish them merely by the different mode of dehiscence of the anthers.

Natural Characters of the Vespertilionine and Emballonurine Alliances compared.

(Vespertilionidæ, Nycteridæ, Rhinolophidæ.)	(Emballonuridæ, Phyllostomidæ.)
1. Tail always contained within the interfemoral membrane, projecting by the tip only from its posterior margin, in no case perforating the membrane, generally long, never absent.	1. Tail rarely contained within the interfemoral membrane, generally perforating the membrane and appearing upon its upper surface, or produced considerably beyond the truncated membrane, frequently short or absent.
2. First phalanx of the middle finger extended (in repose) in a line with the metacarpal bone.	2. First phalanx of the middle finger more or less completely folded forwards (in repose) upon the superior or inferior surface of the metacarpal bone*.
3. Premaxillary bones rudimentary; upper incisors small, weak.	3. Premaxillary bones well developed (except in some genera of *Emballonurinæ*); incisors generally large.
4. Hair-scales imbricated, the tips of the scales in an oblique line, not terminating in acute projections†.	4. Hair-scales in a transverse series, the tips of the scales in a straight line at right angles to the longitudinal axis of the hair, nearly always terminating in acute projections†.

* This folding of the middle finger (in repose) is, I believe, directly related to the habits of the animals, and not to the comparative length of the finger. The differences in habit between the animals of the two alliances I shall describe hereafter.

† Not satisfied with my own examination alone, I submitted the slides on which the specimens of hairs (taken in every case from between the shoulders) were mounted to the inspection of Dr. J. D. Macdonald, F.R.S., asking him in each case to which alliance (as defined by me) the hair under examination belonged. Answers in accordance with the generalization adopted above were obtained in all cases, except in the genera *Miniopterus* and *Mystacina*. These exceptions rather support the generalization than otherwise; for, as I have already remarked, *Miniopterus* is very closely allied to the Emballonuridæ, forming, in fact, the connecting link between that family and the Vespertilionidæ. *Mystacina* has fur of a totally different kind from that of every other species of Bat; and the hair-scales are with difficulty distinguished. *Chalinolobus* and *Nyctophilus* appear to me to be exceptions to the rule that the hair-scales in the species of the Vespertilionine alliance are not terminated by acute projections. However, further investigation may show that this is more apparent than real; for in all genera the under-fur shows a general resemblance in structure, the points of contrast being observed in the longer hairs.

Dr. J. D. Macdonald has very kindly, at my request, permitted me to publish here the following note on the results of his examination of the specimens of hairs of different genera submitted by me to him for his remarks, which agree in all respects with my previous observations stated above:—

"In perhaps all cases the hair is flattish or not quite round, so as to give the deceptive appearance of growing thicker and thinner at intervals. The arrangement of the scales upon the hair presents almost as much variety as the phyllotaxis of plants. Thus they are, naturally as it were, alternately disposed; but opposition and whorling are frequently seen; they may be specially attached to

The last-described character, derived from examination of the minute structure of the hairs, is a valuable one. I was much satisfied to find that it agreed with the system of classification I had sketched out previously. Thus the proper position of *Rhinopoma* among the Emballonuridæ is further shown, and the close affinity of *Noctilio* to the *Mormopes* additionally demonstrated. I have arrived at this generalization from examinations of the minute structure of the fur in almost every genus of the Vespertilionine, and in most of the genera of the Emballonurine alliance*.

Magnified hair of *Corinorhinus townsendi*, typical of the Vespertilionine Alliance.

Magnified hair of *Mormops megalophylla*, typical of the Emballonurine Alliance.

Distribution of the Families of Chiroptera.

As I have remarked above, the lines of descent correspond very closely to the geographical distribution of the Chiroptera. Thus the Nycteridæ and Rhinolophidæ are confined to the Eastern Hemisphere, while the Phyllostomidæ are limited to America, the Vespertilionidæ and Emballonuridæ, as directly derived from the ancestral group (Palæochiroptera), being common to both hemispheres. But another distributional fact may also be observed—namely, that the most highly differentiated and most highly organized species of the Vespertilionine and Emballonurine alliances respectively belong to

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the broad surfaces, or to the borders, or to both, in four or more series. The optical section of the scales often gives the appearance of sharp spines besetting the sides of the hairs.

"It is a curious fact that imbrication, with the tips of the scales in an oblique line, should mark one, and a symmetrical disposition with transverse lines characterize the other of the two alliances into which Mr. Dobson proposes to divide the families of Chiroptera."

* I have examined the microscopic structure of the hair in the following genera:—

1. *Vespertilionidæ.* Miniopterus, Natalus, Thyroptera, Murina, Chalinolobus, Vespertilio, Vesperugo, Atalapha, Scotophilus, Plecotus, Corinorhinus, Otonycteris, Nyctophilus, Antrozous.
2. *Nycteridæ.* Nycteris, Megaderma.
3. *Rhinolophidæ.* Rhinolophus, Phyllorhina, Rhinonycteris.

4. *Emballonuridæ.* Furia, Diclidurus, Colëura, Taphozous, Rhynchonycteris, Noctilio, Rhinopoma, Nyctinomus, Molossus, Mystacina.
5. *Phyllostomidæ.* Chilonycteris, Mormops, Carollia, Rhinophylla, Trachyops, Glossophaga, Monophyllus, Vampyrus, Centurio, Artibeus, Brachyphylla, Desmodus.

families of very limited distribution. Thus the closely allied Nycteridæ and Rhinolophidæ have nearly the same distribution—the former family being confined to tropical and subtropical Africa, Asia, and Australia, the latter to the same continents, a few species extending into Europe; while the Phyllostomidæ are absolutely limited to tropical America. The Pteropidæ, including the largest Bats, are strictly limited to the tropical and subtropical regions of the Old World from Western Africa to the Navigators' Islands; and of these the genera containing the most highly differentiated forms have also the most strictly defined range. This is precisely what we should expect if we regard these families as later developments of the Vespertilionidæ and of the Emballonuridæ. While the older forms are found in both hemispheres, the later developments are still limited to the regions, or remains of the regions, in which they first originated, restricted by changes which had taken place in the distribution of land and water previous to their origin, but subsequent to the appearance of the forms from which they were derived*.

* The families and genera of Chiroptera represented in Asia are as follows:—

Fam. **Pteropidæ**
1. *Pteropus*, Brisson.
2. *Cynopterus*, F. Cuvier.
3. *Cynonycteris*, Peters.
4. *Macroglossus*, F. Cuvier.
5. *Eonycteris*, Dobson.

Fam. **Rhinolophidæ**
6. *Cælops*, Blyth.
7. *Phyllorhina*, Bonap.
8. *Triænops*, Dobson.
9. *Rhinolophus*, Geoffroy.

Fam. **Nycteridæ**
10. *Nycteris*, Geoffroy.
11. *Megaderma*, Geoffroy.

Fam. **Vespertilionidæ**
12. *Plecotus*, Geoffroy.
13. *Synotus*, Keys. & Blas.
14. *Vesperugo*, Keys. & Blas.
15. *Scotophilus*, Leach.
16. *Murina*, Gray.
17. *Vespertilio*, Keys. & Blas.
18. *Kerivoula*, Gray.
19. *Miniopterus*, Bonaparte.

Fam. **Emballonuridæ**
20. *Emballonura*, Temminck.
21. *Taphozous*, Geoffroy.
22. *Rhinopoma*, Geoffroy.
23. *Nyctinomus*, Geoffroy.
24. *Cheiromeles*, Horsfield.

The genera *Eonycteris*, *Cælops*, *Triænops*, and *Cheiromeles* have not been found beyond the limits of Asia; they are, however, each represented by a single species only.

Suborder I. MEGACHIROPTERA.

Family I. PTEROPIDÆ.

The characters of the Family are those of the Suborder.

Synopsis of Genera.

A. Tongue moderate; molars well developed. *Group I. PTEROPI.*

a. Fur of the nape of the neck and shoulders differing in colour from that covering the back; tail none ..... 1. **Pteropus***, p. 15.

b. Fur of the nape of the neck and shoulders not differing in colour from that covering the back; tail generally distinct.

a'. Wings from the sides of the body; index finger with a distinct claw.

a''. Nostrils simple.

α. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ .. 2. **Cynonycteris**, p. 29.

β. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$. 3. **Cynopterus**, p. 23.

γ. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{1-1}{2-2}$ .. 4. EPOMOPHORUS.

b''. Nostrils tubular, projecting abruptly from the muzzle.

δ. Inc. $\frac{2}{0}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$ .. 5. HARPYIA.

b'. Wings from the spine; index finger without a claw.

ε. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{3-3}$, m. $\frac{3-3}{3-3}$ .. 6. CEPHALOTES.

B. Tongue very long, muzzle narrow, elongated; molars very narrow, scarcely raised above the gum ..... *Group II. MACROGLOSSI.*

c'. Index finger without a claw.

c''. Wings from the spine; tail very long.

ζ. Inc. $\frac{1-1}{1-1}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$. 7. NOTOPTERIS.

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* The names of genera represented in Asia are in small Clarendon type, thus—**Pteropus.**

d''. Wings from the sides of the back near the spine, and from the dorsal surface of the second toe.

η. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ .. 8. **Eonycteris**, p. 32.

d'. Index finger with a distinct claw.

e''. Wings from the sides of the body, and from the dorsal surface of the fourth toe.

θ. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ .. 9. **Macroglossus**, p. 34.

PTEROPUS.

Pteropus, *Brisson, Quadrup.* p. 153; *Geoffroy, Ann. du Mus.* xv. p. 90 (1810); *Temminck, Monogr. Mammal.* i. pp. 166–171 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 594; *Peters, MB. Akad. Berl.* 1867, p. 321; *Dobson, J. A. S. B.* 1873, p. 196.

Pteropus *et* Spectrum, *Gray, Cat. Monkeys & Fruit-eating Bats*, p. 100, 102 (1870).

Muzzle long, narrow, and cylindrical; nostrils projecting, the extremity of the muzzle deeply emarginate between; upper lip with a vertical groove in front, bounded laterally by naked prominences; index finger with a distinct claw; metacarpal bone of second finger shorter than the index finger; wing-membrane attached to the back of the first phalanx of the second toe, and from the sides of the hairy back; tail none.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Back of the head and neck and the shoulders generally covered with fur distinct in colour and quality from that of the back.

Large Bats, the head and body attaining a length of 12 inches in one species at least; arboreal; strictly frugivorous, feeding on different fruits ("except oranges," &c.—*Jerdon*), especially on the species of figs and anonads; of the latter family they are particularly fond (in India) of the fruit of *Guatteria longifolia*, eating the soft pericarps and rejecting the kernels, which are commonly found covering the ground beneath trees of this and allied species.

The statement that these Bats occasionally feed upon fish, rests upon insufficient foundation. They certainly are often seen, on leaving their roosts at sunset, to skim the surface of any water close by, and even occasionally to dip into it; but this is probably, in the first instance, to drink, and, secondly, to rid themselves of some of the numerous parasites with which they are so commonly infested.

Although the different species of this genus agree generally in the colour of the fur (bright bay or pale yellowish on the nape of the neck and shoulders, and deep black on the back), yet specimens of the same species are often found to vary very considerably—the males in *P. nicobaricus*, for instance, commonly presenting the general characters of the genus in colour, while the females and young males are usually jet-black throughout.

Range. From the Navigators' Islands through Australia, the Malay archipelago, Japan (Kiousiou Island), Southern China, to India and Ceylon, Seychelle Islands, Madagascar, and Mauritius.

The northern and southern limits of the species appear to be the thirtieth parallel of latitude or thereabouts, extending to slightly higher latitudes in a few localities. No species of this genus has yet been found in Africa*.

Synopsis of the Species.

A. Ears shorter than the muzzle; fur of the back long and straight, like that of the neck, extending upon the legs ..... 1. *P. dasymallus*, p. 16.

B. Ears as long or longer than the muzzle; fur of the back short, appressed, quite different from the long fur covering the neck, scarcely extending upon the legs.

a. Ears shorter than the muzzle, broadly rounded off above ..... 2. *P. nicobaricus*, p. 17.

b. Ears as long or longer than the muzzle, narrowed above and subacutely pointed.

a'. Fur of the back narrow across the loins, following line of attachment of wing-membrane..... 3. *P. medius*, p. 18.

b'. Fur of the back much wider across the loins.

a''. Ears longer than the muzzle (*i. e.* longer than the distance between the eye and end of nose) ..... 4. *P. edulis*, p. 20.

b''. Ears not longer than the muzzle; tips rounded off ..... 5. *P. jubatus*, p. 21.

1. Pteropus dasymallus.

Pteropus dasymallus, *Temminck, Monogr. Mamm.* i. p. 180, pl. 10; *Peters, MB. Akad. Berl.* 1867, p. 323.

Spectrum dasymallum, *Gray, Cat. Monkeys & Fruit-eating Bats*, p. 101.

Ears shorter than the muzzle, rising but slightly above the fur of the head, shaped somewhat like those of *Cynopterus*, the upper third of the outer margin slightly concave, and of the inner margin convex. Fur long and woolly on all parts, on the back similar to that covering the lower surface of the body; head and face reddish brown; nape of neck, shoulders, and part of the back pale buff, not defined by a straight line, passing rather irregularly into the light-brown fur of the back; beneath, a band of pale buff fur passes round the neck; the chest and abdomen brown, with yellowish hairs. On the upper surface the fur extends densely upon the wings, along the sides of the body, and upon the arm and forearm, also upon three fourths of the legs and interfemoral membrane. Beneath, the wing-membrane behind the forearm is thickly covered with long hairs, but the tibiæ and interfemoral membrane are nearly naked.

Length, head and body 8″, ear 0″·8, eye to tip of nostril 1″, forearm 4″·5, thumb 2″·2, second finger 8″·75, fourth finger 6″·5, tibia 2″·3, foot and claws 1″·8.

Hab. Japan.

* On this see Peters, 'Reise nach Mossambique' (1852).

2. Pteropus nicobaricus.

Pteropus nicobaricus, *Fitzinger, Sitzungsb. Wien. Akad.* 1860, p. 389 (*nomen nudum*); *Zelebor, Reise der öster. Freg. Novara, Säugeth.* 1868, p. 11; *Dobson, J. A. S. B.* 1873, p. 198.
Pteropus melanotus, *Blyth, Cat. Mammal. Mus. As. Soc. Bengal* (1863), p. 20 (*nomen nudum*).

Ears rounded off at the tip, their breadth nearly equal to their length; the upper third of the outer margin slightly flattened, not concave, the lower two thirds convex; in fully grown individuals the longest diameter of the opening of the external ear, from the point of junction of the outer and inner margins below to the tip above, scarcely exceeds one inch.

P. nicobaricus.

The distribution of the fur is similar to that of *Pt. medius*; but the hair on the wing-membrane is very much shorter.

In some male specimens the colour of the fur also corresponds very closely with that of *P. medius*; generally, however, the lighter-coloured portions of fur on the nape of the neck, and on the shoulders and chest, are of a deeper hue than in the latter species, usually dark ferruginous red or chestnut; females and young males are commonly *intensely black throughout*; in some female specimens the position of the light-coloured tippet in the male is indicated by a reddish tinge of the black hair.

The skull differs from that of *P. medius* in being shorter, wider across the maxillary and nasal bones, and in having all its processes and crests much more strongly defined. The distance between the small anterior upper premolars of opposite sides exceeds that in *P. medius* by one tenth of an inch. The *foramen ovale* is divided in the centre by a process of bone; in *P. medius* it is undivided. A postorbital process of the zygomatic arch is present, though not so well defined as in *P. medius*.

The mandible is shorter and its rami deeper than in *P. medius*: the coronoid process is more developed vertically; its posterior margin is nearly straight, not deeply concave; and its superior angle is narrowly, not broadly, rounded off, as in the latter species.

The teeth are stouter in *P. nicobaricus*; but their general characters are the same in both species.

Length (of an old ♂), head and body 10″·5, head 3″, ear to tip of nostril 2″·65, eye to tip of nostril 1″·15, forearm 6″·5, thumb 2″·8, second finger 12″·5, fourth finger 8″·5, tibia 3″, foot and claws 2″, width of head across centres of zygomatic arches 1″·8.

Hab. Andaman and Nicobar Islands, probably Sumatra, Java, and neighbouring small islands also*.

3. Pteropus medius.

Pteropus edwardsii, *Geoffroy, Ann. du Mus.* xv. p. 92 (1810); *Jerdon, Mamm. of India*, p. 18 (1867).
Pteropus medius, *Temminck, Monogr. Mammal.* i. p. 76; *Peters, MB. Akad. Berl.* 1867, p. 325; *Dobson, J. A. S. B.* 1873, p. 196, pl. xiv.
Pteropus leucocephalus, *Hodgson, J. A. S. B.* iv. p. 699.
Pteropus assamensis, *M'Clelland, P. Z. S.* vii. (1839) p. 148.

Ears long, with acutely pointed tips, the upper third of the outer margin concave beneath the tip; in fully grown individuals the longest diameter of the opening of the external ear, from the point of junction of the outer and inner margins below to the tip above, measures one inch and a half.

P. medius.

Nostrils projecting, with a deep intervening emargination; upper lip with a narrow vertical groove in front, bounded laterally by naked rounded prominences continuous with the integument of the nostrils.

* PTEROPUS CONDORENSIS.

Pteropus condorensis, *Peters, MB. Akad. Berl.* 1869, p. 393.

The following is a translation of Dr. Peters's description of *Pteropus condorensis*, of which I have not yet seen the type, but which appears to me, from the description, very close to, if not identical with, *P. nicobaricus*:—

"This species agrees closely, in the form of the skull, zygomatic arches, and teeth, with *P. edulis* and *P. edwardsii*, but is perceptibly smaller, and has proportionally shorter, broader, and more rounded ears; and the last upper molar tooth lies almost quite behind the root of the zygomatic process of the upper jaw.

"The fur of the back is dark brown mixed with gray. The hairs of the head and neck are ferruginous red, with darker tips; those of the breast and abdomen black at the base, then reddish yellow, with reddish tips, except on the sides of the abdomen, where the extremities of the hairs are black."

The ears are naked, except at the bases posteriorly and a narrow triangular portion covered with short hairs terminating towards the middle of the outer margin; the anterior flattened edge of the inner side of the conch is covered from the base upwards for about one third of the length of the ear.

The face is naked in front of a line joining the inner angles of the eyes; and on either side of the naked space (which corresponds to the position of the nasal bones) a few long fine hairs arise from separate papillæ. The fur is rather dense and moderately long upon the back of the head, neck, and shoulders, but short and appressed upon the back, narrowing to about two inches in width across the loins. A narrow line of short fur passes outwards upon the wing-membrane, posterior to the humerus, for rather more than half its length; the elbow is quite naked; but a few short hairs cover a narrow portion of the wing-membrane, about one inch and a half long, posterior to the forearm. The femur and the interfemoral membrane, as far as a line corresponding to the position of the semicircular band on the under surface of the membrane, are covered. The tibiæ are naked, or have only a few very short hairs; the feet are quite naked.

On the under surface the whole body is well covered; the antebrachial membrane is similarly clothed as far as a line drawn from the knee to a point about one inch posterior to the elbow-joint; thence the hair passes outwards upon the wing-membrane posterior to the forearm, terminating at about the beginning of the distal third of the radius. The thighs are covered; the legs and interfemoral membrane are quite naked.

The nape of the neck and the shoulders are usually reddish yellow or golden yellow or pale straw-colour; but every shade of these colours has been observed, the different colours and intermediate shades appearing to depend on sex, age, season, and locality. The darker shades are usually found in females; and I believe that the female will always be found darker than the male of the same age belonging to the same colony.

The chest and upper part of the abdomen are either of the same colour as the nape of the neck or of a darker hue. The remainder of the fur is black or dark brown, often mixed with solitary grayish hairs.

The fur of the neck is coarser and longer than that covering other parts of the body. In most male specimens a circular tuft of rigid unctuous hairs, of a bright reddish yellow colour, is found on each side of the neck, situated midway between the base of the ear and origin of the antehumeral portion of the wing-membrane from the shoulder. In a large male, obtained near Calcutta, these tufts occupy a space one inch in diameter, and the hairs composing them measure about one third of an inch in length.

Length (of an adult ♂), head and body 10″·5, head 3″, ear 1″·45 × 0″·8, ear from end of nostril 2″·8, eye from end of nostril 1″·2, forearm 6″·3, thumb 2″·5, second finger 11″·9, fourth finger 8″, tibia 2″·8, foot and claws 2″.

Hab. Peninsula of India (from Kachh on N.W. and Assam N.E. to Cape Comorin. According to Dr. Leith Adams not found in the Panjab or Himalaya); Ceylon, Arracan, Tenasserim province, Pegu.

This is the only species of *Pteropus* as yet known to inhabit the peninsula of India. Specimens from Kachh, Madras, and Bengal exhibit on comparison no appreciable difference.

Wherever fruit is abundant throughout the Indian peninsula (south of the Panjab), this species, the "Flying Fox" of Europeans, is to be found. A colony, consisting of many hundreds of individuals, is often found inhabiting a single large tree, which is so covered that the animals, hanging head downwards, wrapped up in their wings, resemble large dark-coloured leaves. I have often been able to detect their presence on trees at night by the strong musky odour evolved from their bodies, which fills the motionless air, and which is probably due to the secretions of the shoulder-glands. Mr. Francis Day, who has had the opportunity of observing the habits of this species for many years, remarks:—"In their diet they are exclusively frugivorous; and they do very great injury to cocoa-nut plantations and mangoe gardens. Their habits are very intemperate; and they often pass the night drinking the toddy from the chatties in the cocoa-nut trees, which results either in their returning home in the early morning in a state of extreme and riotous intoxication, or in being found the next day at the foot of the trees sleeping off the effects of their midnight debauch. The wild almond (*Terminalia catappa*), when in fruit, is one of their favourite resorts at night-time; they sometimes carry off the almonds into the verandahs of houses, where they extract the kernels, and in so doing frighten nervous people into the belief that robbers are endeavouring to effect an entrance. They are also very partial to wild figs"*.

4. Pteropus edulis.

Pteropus edulis, *Geoffroy, Ann. du Mus.* xv. p. 92; *Temminck, Monogr. Mammal.* i. p. 172, ii. p. 58; *Peters, MB. Akad. Berl.* 1867, p. 324; *Dobson, J. A. S. B.* 1873, p. 197, pl. xiv. fig. 1.
Pteropus javanicus, *Desmarest, Mammalogie,* p. 109 (1820).
Pteropus funereus, *Temm. l. c.* ii. p. 63.

This species, the largest of known Bats, may be readily distinguished from *P. medius* by its ears and by the distribution of the fur. The ears are proportionally shorter and narrower than in *P. medius*; and the concavity of the upper third of the outer margin is much less distinct. In a specimen in the Indian Museum, from Java, the ears are about the same length as in the most adult specimen of *P. medius*, whilst its forearm exceeds that of the latter species by more than two inches, and the tibia by an inch and a half. The wing-membrane arises from the sides of the body at a greater distance from the spine than in *P. medius*; and the breadth across the

* Land of the Permauls, p. 439.

loins occupied by hair is much greater than in that species; this is well seen when specimens of equal size are compared, the breadth of the fur in this position in the not fully grown *P. edulis* being nearly, if not quite, double that in the adult *P. medius*. Elsewhere the distribution of the fur is similar in both species; but the hair on the wing-membranes and legs is conspicuously much longer in *P. edulis*.

The colour of the fur varies greatly. In the large collections in the Leyden and Paris Museums I found the fur of the back of the head and neck varying from dark reddish brown to bright red; females generally darker. Some specimens in the Leyden Museum (types of *P. pluto* et *funereus*) are intensely black throughout.

Length (of an adult ♂ preserved in alcohol), head and body 12″, head 4″, ear 1″·75 × 0″·9, ear from tip of nose 3″·2, eye from tip of nose 1″·5, forearm 8″·8, thumb 4″, second finger 16″·5, fourth finger 11″·3, tibia 4″·3, foot and claws 3″·3.

Hab. Sumatra and Java.

5. Pteropus jubatus.

Pteropus jubatus, *Eschscholtz, Zool. Atlas*, iv. p. 1, pl. 16 (1831); *Temminck, Monogr. Mammal.* ii. p. 51; *Wagner, Suppl. Schreb. Säugeth.* v. p. 595; *Peters, MB. Akad. Berl.* 1867, p. 332.

Pteropus pyrrhocephalus, *Nov. Act. Soc. Cæsar. Leop. Car. nat. cur.* xvi. p. 604.

Acerodon jubatus, *Jourdan, F. Cuvier, Ann. des Sc. Nat.* viii. p. 376.

Ears shorter than in *P. medius*, triangular in upper third; tips rounded off, obtuse; upper third of the outer margin flattened, tip subacute or bluntly angular. Index finger exactly equal to metacarpal bone of the second finger in length; wings less than one inch apart at origin from the sides of the back, but the fur, though very short, occupies a space nearly three inches wide in this position; legs naked, or with a few scattered hairs only. Fur on the head greyish yellow, on nape of neck reddish yellow, black on back; face black; under surface of neck red; breast and abdomen deep reddish brown intermixed with greyish hairs.

First upper premolar closer to the canine than to the second premolar in the young, deciduous in the adult. Outer lower incisors much larger than central ones. Anterior inner cusps of the upper molars well developed.

Length, head and body 10″, head 3″·3, eye to tip of nostril 1″·2, ear 1″·25, forearm 7″·2, thumb 3″·2, second finger 14″·5, fourth finger 9″·2, tibia 3″·3, foot and claws 2″·1, calcaneum 1″, interfemoral membrane in centre 0″·7.

Hab. Philippine Islands (Luzon).

This species was made the type of a genus *Acerodon* by Jourdan on account of the large size of the anterior inner cusps of the upper molars in a young specimen.

Table exhibiting relative measurements (in inches) of some species of Pteropus.

	Pteropus medius.					*Pteropus nicobaricus.*					*P. edulis.*	
	Calcutta.	Maunbhum.	Calcutta.	Pegu.	Assam.	Nicobars.	Andamans.	Andamans.	Andamans.	Java.	Java.	Java.
	♂	♂	♂	♂	♂	♂	♀	♂	♀	♀	♂	♂
Length, head and body	9·0	...	7·5	9·0	10·5	10·5	8·8	8·0	9·8	9·0	...	12·0
,, head	3·1	3·15	2·75	3·0	3·0	3·0	3·0	3·0	2·9	2·8	3·5	4·0
,, ear (anteriorly)	1·5	1·40	1·45	1·5	1·45	1·05	1·05	1·1	1·05	1·05	1·5	1·75
Breadth, ear	0·85	...	0·8	0·8	0·8	0·8	0·8	0·8	0·8	0·8	0·75	0·9
Length from ear to tip of nostril	2·7	...	2·4	2·6	2·8	2·65	2·45	2·5	2·35	2·35	2·8	3·2
,, from eye to tip of nostril	1·3	...	1·1	1·15	1·2	1·15	1·15	1·1	1·15	1·05	1·2	1·5
,, of forearm	6·6	6·7	6·0	6·2	6·3	6·5	5·8	5·9	5·8	5·4	8·5	8·8
,, thumb	2·7	2·7	2·8	2·65	2·5	2·8	2·5	2·6	2·6	2·35	3·6	4·0
,, second finger	12·5	13·5	11·5	11·8	11·9	12·5	11·0	10·5	11·5	11·5	16·0	16·5
,, fourth finger	8·5	8·5	7·8	8·0	8·0	8·5	7·4	7·8	7·8	8·0	10·5	11·3
,, tibia	3·0	3·2	2·7	2·8	2·8	3·0	2·8	2·7	2·6	2·6	4·0	4·3
,, foot and claws	2·3	2·3	2·0	2·0	2·0	2·0	1·7	2·0	2·0	2·0	2·4	3·3
,, calcaneum	1·0	0·9	0·85	0·8	0·8	0·9	0·65	0·85	...	0·75	1·5	1·75

CYNOPTERUS.

Cynopterus, *F. Cuvier, Dents des Mammif.* p. 39 (1825); *Peters, MB. Akad. Berl.* 1867, p. 866; *Gray, Cat. Monkeys &c.* 1870, p. 121; *Dobson, J. A. S. B.* 1873, p. 200.
Pachysoma, *Is. Geoffroy, Dict. Class. Hist. Nat.* p. 705 (1828).

Muzzle much shorter than in *Pteropus*, and comparatively thicker; nostrils projecting, deeply emarginate between; upper lip with a vertical groove in front, bounded laterally by naked prominences, as in *Pteropus*; index finger with a distinct claw; metacarpal bone of second finger exceeding slightly in length the index finger; wings from the sides of the hairy back; wing-membrane attached to the base of the first toe; tail short, distinct (except in *Megœrops*).

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$.

The shortness of the muzzle leaves no room for the last molar, which is accordingly absent.

Range. Southern Asia and its islands, from Northern India to the Philippine Islands.

This genus appears to me most closely allied to *Pteropus*, even more so than *Cynonycteris*, which agrees with that genus in dentition. The form of the nostrils and of the narrow groove on the upper lip, bounded by naked, raised, prominent margins, are quite the same as the same parts in *Pteropus*; while in *Cynonycteris* the groove on the upper lip is wide and deep, with slanting sides. The absence of a tail in one of the species, *C.* (*Megœrops*) *ecaudatus*, gives further indication of its natural affinities.

Synopsis of the Subgenera and Species.

A. Tail distinct.
- *a.* Incisors $\frac{4}{4}$ ..... Subgenus *Cynopterus*, p. 24.
  - *a'*. Base of the outer margin of the ear-conch straight or faintly convex.
    - *a''*. Ears nearly double the length of the muzzle, margined very distinctly with white ..... 1. *C. marginatus*, p. 24.
    - *b''*. Ears not much longer than the muzzle, no distinct white margin.
      - *a'''*. Fur of the head scarcely differing in colour from that covering the back; ears narrow .. 2. *C. scherzeri*, p. 26.
      - *b'''*. Fur of the head black, contrasting with the much lighter-coloured fur of the body; ears oval ..... 3. *C. melanocephalus*, p. 27.
  - *b'*. Base of the outer margin of the ear-conch forming a distinct rounded projection ..... 4. *C. brachysoma*, p. 27.
- *b.* Incisors $\frac{4}{2}$ ..... Subgenus *Ptenochirus*, Ptrs., p. 28.
  - *c''*. Ears not margined with white; inner upper incisors much longer than the outer ones ..... 5. *C. jagorii*, p. 28.

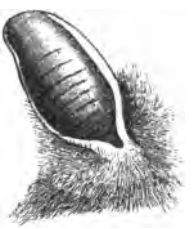
B. Tail none.
c. Incisors $\frac{4}{2}$ ..... Subgenus *Megærops*, Ptrs., p. 29.
6. *C. ecaudatus*, p. 29.

Tail distinct: incisors $\frac{4}{4}$. Subgenus CYNOPTERUS.

1. Cynopterus marginatus.

Pteropus marginatus, *Geoff. Ann. du Mus.* xiv. p. 97; *Temm. Monogr. Mammal.* i. p. 202, pl. xiv.
Cynopterus marginatus, *F. Cuvier, Dents des Mammif.* p. 39 (1825); *Kelaart, Prodr. Faunæ Zeylanicæ*, p. 28 (1852); *Blyth, ibid.* p. 37; *Peters, MB. Akad. Berl.* 1867, p. 863; *Jerdon, Mamm. of India*, p. 20 (1867); *Gray, Cat. Monkeys and Fruit-eating Bats*, p. 122 (1870); *Dobson, J. A. S. B.* 1873, p. 200, pl. xiv. fig. 4 (ear).
Pteropus titthescheilus, *Temm. l. c.* i. p. 198.
Pachysoma diardii *et* duvaucellii, *Is. Geoffr. Dict. Class. Hist. Nat.* xiv. p. 705; *Temminck, l. c.* ii. pp. 95, 96.
Pachysoma brevicaudatum, *Is. Geoff. l. c.*; *Temminck, l. c.* p. 92.
Pteropus pyrivorus, *Hodgson, P. Z. S.* 1836, p. 36.
Cynopterus horsfieldii, *Gray, Cat. Mamm. Brit. Mus.* p. 38 (1843); *Horsfield, Cat. Mamm. Mus. E. I. Comp.* p. 30 (1851).
Pachysoma luzoniense, *Peters, MB. Akad. Berl.* 1861, p. 708.
Eleutherura marginata, *Gray, P. Z. S.* 1866, p. 64.

Ears large, rounded at the tip, with a slight but distinct concavity of the outer margin immediately beneath the tip; both the outer and inner margins of the ear-conch are bordered with white; the white border along the inner margin is one twelfth of an inch wide, and contrasts strongly with the dark brown colour of the ear; the



C. marginatus.

outer margin terminates below without forming a lobe at the base. Nostrils projecting, with a deep emargination intervening. The upper lip marked in the centre, as in *Pteropus*, with a narrow vertical groove, bounded laterally by naked prominences continuous with the integument of the nostrils.

Ears naked posteriorly, except at their bases; anteriorly a few hairs appear upon the conch along the outer side of the white border of the inner margin, and, similarly, along the inner side of the white border of the outer margin. On the upper surface the fur extends upon the wing-membrane nearly as far as a line joining the elbow- and knee-joints, also thinly upon the humerus, the femur, and

proximal end of the tibia; beneath, the antebrachial membrane is covered with moderately long, thinly spread hairs, and the wing-membrane is clothed to about the same extent as upon the upper surface, the hairs also passing outwards in a narrow band posterior to the forearm. The colour of the fur is extremely variable—dark brown, reddish brown, snuff-brown, or olive-brown, sometimes with a bluish tinge throughout. The fur of the male is distinguished from that of the female, especially during the rutting-season, by a collar of stiff radiating reddish yellow hairs, the coarseness and colour of which appear to depend upon the presence of glands on the sides and on the inferior surface of the neck, similar to those on the shoulders of most species of *Pteropus* and *Epomophorus*.

Upper incisors close together, short, equal in length, placed in a straight line in the space between the canines, from which a slight interval separates them on each side; lower incisors somewhat smaller, forming a slightly arched row, the outer incisors on each side separated as above by a small space from the canine*. First upper premolar minute, in the centre of the space between the canine and second premolar, and slightly to the outer side of the tooth-row; second premolar nearly equal to the lower canine in vertical extent.

Length (of an adult ♂ recently killed), head and body 4″·4, tail 0″·4, head 1″·5, ear 1″ × 0″·5, ear from tip of nostril 1″·2, eye from tip of nostril 0″·5, forearm 3″, second finger 5″, fourth finger 3″·7, thumb 1″·1, tibia 1″·1, foot and claws 0″·7.

Hab. India generally, from the Himalaya to Cape Comorin; Ceylon, Andaman Islands, Arracan, Burma, Malay peninsula, Siam, Sumatra, Java, Borneo, Celebes, Philippine Islands.

This Bat is very common in India, and extremely destructive to fruit of all kinds, especially to guavas, plantains, and mangoes. To a specimen of this Bat, obtained by me at Calcutta, uninjured, I gave a ripe banana, which, with the skin removed, weighed exactly two ounces. The animal immediately, as if famished with hunger, fell upon the fruit, seizing it between the thumbs and the index fingers, and took large mouthfuls out of it, opening the mouth to the fullest extent with extreme voracity. In the space of three hours the whole fruit was consumed. Next morning the Bat was killed, and found to weigh one ounce, half the weight of the food eaten in three hours! Indeed the animal when eating seemed to be a kind of living mill, the food passing from it almost as fast as devoured, and apparently unaltered, eating being performed alone for the sake of the pleasure of eating. This will give some idea of the amount of destruction these Bats are capable of producing

* I find two lower incisors only in a specimen of an adult male obtained by Dr. Anderson during the second Yunan Expedition at Bhamo. The canines and molar teeth are much worn; and the remaining incisors are quite level with the gum. The lower inner incisors have probably fallen out, and their former position become hidden by the gum closing in above, while the interval naturally existing on each side between the canines and the incisors causes the remaining two incisors to appear symmetrically placed between the canines, each incisor occupying the centre of each half space.

among ripe fruits. "In Nipal this Bat is a perfect pest, from the havoc it makes among the ripe pears and guavas. Mr. Hodgson says they are only seen in Nipal about midnight, when they come to feed from very considerable distances. In the plains it is noted of them that they will travel from thirty to forty miles, and as many back, in the course of a single night, in order to procure food" *.

Subsp. *a*. **Cynopterus brachyotus.**

Cynopterus brachyotus, *Müller, Van der Hoeven, Tijdsch. Natuur. Gesch.* v. p. 146.
Cynopterus marginatus, var. andamanensis, *Dobson, J. A. S. B.* 1873, p. 201.

This subspecies is readily distinguished from *C. marginatus* by

C. marginatus.

C. brachyotus.

the small size of the ears, which are similarly margined with white. The relative size is very well shown in the above woodcuts.

Specimens of young individuals of *C. marginatus*, from Bengal, with forearm-bones nearly half an inch shorter than specimens of adult animals of this form have considerably larger ears. (See relative measurements in table, p. 31.)

Examination of the types of *C. brachyotus* in the Leyden Museum has shown me that the Andaman-Island variety described by me is identical with Müller's species.

2. **Cynopterus scherzeri.**

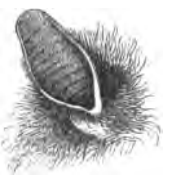
Pachysoma scherzeri, *Fitzinger, Sitzungs. Wien. Akad.* 1860, p. 389 (*nom. nudum*).
Cynopterus marginatus, var. Pachysoma scherzeri, *Zelebor, Reise der öster. Freg. 'Novara,' Säugeth.* p. 11 (1868).

This species, like *P. nicobaricus*, was named but not described by Fitzinger; and Zelebor regards it as a variety of *C. marginatus*. It is at once distinguished from that species by its small and narrow ears, which are also not margined with white. When adult speci-

* Hutton, P. Z. S. 1872, p. 693.

mens of *C. marginatus* and of this species are compared together, the difference in the size and shape of the ears is very striking.

C. marginatus.



C. scherzeri.

The muzzle is thicker in front and the colour of the fur much darker than in any specimen of *C. marginatus*.

Length (of an adult ♀ preserved in alcohol), head and body 3″·7, tail 0″·55, head 1″·3, ear 0″·63 × 0″·32, eye to tip of nostril 0″·45, forearm 2″·7, thumb 1″, second finger 4″·75, fourth finger 3″·5, tibia 1″, foot and claws 0″·6.

Hab. Car-Nicobar Island; found beneath the leaves of the cocoa-nut palms.

3. Cynopterus melanocephalus.

Pteropus melanocephalus, *Temm. Monogr. Mamm.* i. p. 190, pl. xii.
Cynopterus melanocephalus, *Peters, MB. Akad. Berl.* 1867, p. 867.

Ears small, oval; nostrils projecting considerably, deeply emarginate between. Fur above extending to the wing-membranes as far as a line drawn between the elbow and the knee; beneath almost confined to the body. Head black; shoulders and back pale reddish buff at the base of the hairs, the extremities light reddish brown; beneath pale buff throughout. The colour of the hair on the upper surface appears in the type specimen considerably faded.

Teeth as in *C. marginatus*; last lower premolar very small, much smaller than upper one.

Length (of the type specimen), head and body 2″·8, ear 0″·4, eye from tip of nostril 0″·25, forearm 1″·7, thumb 0″·6, second finger 3″, fourth finger 2″·2, tibia 0″·6, foot and claws 0″·5.

Hab. Java.

The type in the Leyden Museum is the only specimen of this the smallest species of *Cynopterus* yet obtained.

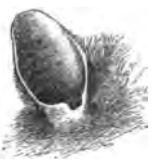
4. Cynopterus brachysoma.

Cynopterus brachysoma, *Dobson, J. A. S. B.* 1871, p. 260; 1873, p. 202, pl. xiv. fig. 7.

Ears slightly longer than the muzzle, broadly rounded off above, the upper third of the outer margin straight or even slightly convex; the presence of a rounded lobe at the base of the outer margin at once distinguishes this species.

Body very short and thick. Fur slaty blue, with a greyish or silvery tinge, the tip of the hairs sooty brown. The fur of the back

C. brachyotus.



C. brachysoma.

is continuous with that of the abdomen through the notch in the interfemoral membrane, and completely conceals the short and slender tail. Above, the fur of the back extends upon the wing-membrane as far as a line drawn between the elbow- and knee-joints, covering it with long hair, also upon the humerus, half the length of the forearm, the femur, and proximal end of the tibia.

Length (of an adult ♀ preserved in alcohol), head and body 2″·9, tail 0″·25, head 1″·25, eye to tip of nostril 0″·4, ear 0″·6 × 0″·35, forearm 2″·2, second finger 4″, fourth finger 3″, thumb 0″·9, tibia 0″·8, foot and claws 0″·5.

Hab. Southern Andaman Island.

Type in the collection of the Indian Museum.

Tail distinct: incisors $\frac{4}{2}$; *upper middle incisors longer than the outer ones.*
Subgenus PTENOCHIRUS.

Ptenochirus, *Peters, MB. Akad. Berl.* 1861, p. 707.

5. Cynopterus jagorii.

Pachysoma (Ptenochirus) jagorii, *Peters, MB. Akad. Berl.* 1861, p. 707; *id. l. c.* 1871, p. 867.

Ears like those of *C. marginatus*, but shorter and not margined with white; the outer margin also is less concave in upper third.

The fur of the body extends slightly upon the wing-membrane; but the under surface of the forearm is nearly naked. Fur above dark brown; beneath, a paler shade of the same colour.

Outer upper incisors less than half the size of the inner ones; lower incisors two, not much crowded, bifid; first upper premolar very small, in the narrow space between the canine and the large second premolar, but on the outer side (not outside) of the tooth-row; first lower premolar not so small, and in the centre of the tooth-line.

In all other respects, in the form of the head, muzzle, and body, &c., similar to *C. marginatus*.

Length, head and body 4″, tail 0″·5, ear 0″·7 × 0″·4, forearm 3″·1, thumb 1″·2, second finger 5″·2, fourth finger 3″·8, tibia 1″·2, foot and claws 0″·75.

Hab. Philippine Islands (Luzon).

Type in the collection of the Berlin Museum.

Tail none; incisors $\frac{4}{2}$, Subgenus MEGÆROPS.

Megæra, *Temm. Monogr. Mamm.* ii. p. 359.
Megærops, *Peters, MB. Akad. Berl.* 1867, p. 867.

6. Cynopterus ecaudatus.

Pachysoma ecaudatum, *Temm. l. c.* ii. p. 94.
Megæra ecaudata, *Temm. l. c.* p. 359; *Wagner, Suppl. Schreb. Säugeth.* v. p. 611.
Megærops ecaudatus, *Peters, l. c.* p. 868.

Head and muzzle as in *C. marginatus*; apertures of nostrils rather wide, opening sublaterally; ears small, oval, very similar in relative size and shape to those of *C. melanocephalus*.

Fur yellowish brown throughout, extending broadly upon the wing-membrane across the loins as far outwards as a line drawn from the elbow- to the knee-joint; beneath, the fur is almost confined to the body.

Length (of the type specimen), head and body about 3″·8, ear 0″·5, eye from tip of nostril 0″·4, forearm 2″·1, thumb 0″·8, second finger 3″·8, fourth finger 2″·8, tibia 0″·75, foot and claws 0″·5.

Hab. Sumatra.

The only specimen of this species yet obtained is preserved in the Leyden Museum.

CYNONYCTERIS.

Cynonycteris, *Peters, Reise nach Mossambique*, p. 25; *Dobson, J. A. S. B.* 1873, p. 202.

Muzzle long and cylindrical; nostrils projecting; upper lip with a wide groove in front, with smooth not elevated margins; index finger with a distinct claw; metacarpal bone of second finger exceeding or equalling the index finger in length; wings from the sides of the hairy back; wing-membrane from the base of the second toe; tail short, distinct.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Teeth very similar in form and in relative size to those of *Pteropus*.

The very close affinity of this genus with *Cynopterus* is shown in the occurrence of a transitional form, *Cynonycteris grandidieri*, Peters, from Africa, which has the external form of *Cynopterus*, short muzzle and similar upper lip, and the dentition of *Cynonycteris*; but the last molar in the upper and last two molars in the lower jaw are quite rudimentary, and scarcely perceptible without removing the gum. It is therefore very questionable whether *Cynonycteris* can be considered more than a subgenus of *Cynopterus*.

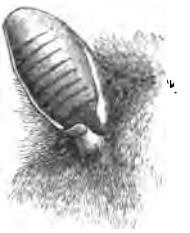
Range. From the Philippine Islands through the Malay peninsula to Siam, Burma, India, Persian Gulf (Kishm Island), Palestine, Egypt, Abyssinia, and east coast of Africa to Natal, Madagascar.

1. Cynonycteris amplexicaudata.

Pteropus amplexicaudatus, *Geoff. Ann. du Mus.* xv. p. 96; *Temm. Monogr. Mammal.* i. p. 200.

Pteropus leschenaultii, *Desmar. Mammal.* p. 110 (1821); *Blyth, Cat. Mamm. Mus. As. Soc. Beng.* p. 21.
Pteropus seminudus, *Kelaart, J. A. S. B.* xxi. p. 345 (1852).
Cynonycteris amplexicaudata, *Peters, MB. Akad. Berl.* 1867, p. 865; *Dobson, P. A. S. B.* 1872, p. 154; *J. A. S. B.* 1873, p. 202, pl. xiv. fig. 8.
Cynonycteris infuscata, *Peters, l. c.* 1873, p. 487.

Head long, triangular; upper lip with a wide groove directly continuous with the emargination between the nostrils, the edges of the



C. amplexicaudata.

grooves smooth, not thickened as in *Pteropus* and *Cynopterus*; ears moderate, triangular, rounded at the tip, the upper half of the outer margin straight, the lower half convex.

Posteriorly the ears are naked, except at their bases, anteriorly the conch is clothed with a few very short fine hairs. The fur of the body extends upon the humerus and upon the fleshy part of the forearm, the remaining part to the carpus has only a few very fine hairs. The portion of the back and wing-membrane covered with fur across the loins is not more than an inch in breadth. The interfemoral membrane is densely covered with hair at the root of the tail, and on either side as far as lines drawn from the knee-joints to the base of the free portion of the tail; the remaining portion, the legs, and a considerable part of the wing-membrane beyond are clothed with short thinly spread fur, which extends along the wing-membrane and legs to the backs of the feet. Beneath, the antehumeral membrane is clothed with rather long, thinly spread fur, and the wing-membrane is similarly covered as far as a line drawn from the knee to a point about half an inch posterior to the elbow, whence the fur extends outwards posterior to the forearm to the carpus. The interfemoral membrane, the legs, and the feet are covered with a few very short hairs. Fur short, varying in colour from dark olive or smoky brown to reddish or yellowish brown. First upper premolars minute, equally distant from the canine and second premolar; second premolar exceeding lower canine in vertical extent; first lower premolar small, less than half the size of the second premolar; second premolar nearly equal to lower canine in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 4″·3, tail 0″·65, head 1″·7, ear 0″·8 × 0″·55, ear to tip of nostril 1″·4, eye to tip of nostril 0″·6, forearm 3″·15, thumb 1″, second finger 5″·2, fourth finger 3″·9, tibia 1″·4, foot and claws 0″·85.

Table exhibiting relative measurements of some species of Cynopterus *and of* Cynonycteris.

	Cynopterus.								Cynonycteris.		
	C. marginatus.		*C. brachyotus.*			*C. scherzeri.*		*C. brachycoma.*	*C. amplexicaudata.*		*C. minor.*
	Calcutta.	Darjeeling.	Andamans.	Andamans.	Andamans.	Car-Nicobar.	Car-Nicobar.	Andamans.	Persian Gulf.	Bengal.	Java.
	♂	♂	♀	♂	♀	♀	♀	♀	♂	♂	♀
Length, head and body	4·4	3·9	3·7	3·3	3·4	3·75	3·7	2·9	4·1	4·3	3·7
„ tail	0·4	0·6	0·4	0·35	0·4	0·55	0·55	0·25	0·65	0·65	0·45
„ head	1·5	1·5	1·4	1·3	1·4	1·25	1·3	1·25	1·7	1·7	1·55
„ ear (anteriorly)	1·0	0·9	0·7	0·7	0·68	0·6	0·63	0·6	0·8	0·8	0·68
Breadth, ear	0·6	0·6	0·4	0·4	0·4	0·3	0·32	0·4	0·55	0·55	0·35
Length, ear to tip of nostril	...	1·2	1·15	1·0	1·15	1·0	1·05	1·0	1·4	1·4	1·3
„ eye to tip of nostril	...	0·5	0·5	0·48	0·48	0·45	0·45	0·4	0·65	0·6	0·45
„ forearm	3·0	2·9	2·6	2·6	2·8	2·7	2·7	2·2	3·2	3·15	2·8
„ thumb	1·1	1·1	1·0	0·95	1·0	1·0	1·0	0·9	1·25	1·0	0·9
„ second finger	5·0	4·9	4·7	4·2	4·7	4·7	4·75	4·0	5·4	5·2	4·4
„ fourth finger	3·7	3·5	3·3	3·1	3·5	3·4	3·5	3·0	3·7	3·9	3·3
„ tibia	1·1	1·1	1·0	0·95	1·05	1·0	1·0	0·8	1·35	1·4	1·05
„ foot and claws	0·7	0·7	0·6	0·55	0·6	0·6	0·6	0·5	1·0	0·85	0·75

Hab. From the Persian Gulf to the Philippine Islands; Bengal, Southern India, Ceylon, Burma, Celebes, Amboyna, Timor, Aru Islands.

C. ægyptiacus, Geoffr., from N.E. Africa, is closely allied to this species. It is distinguished by the much shorter and thicker muzzle, shorter forearm, and longer thumb and foot.

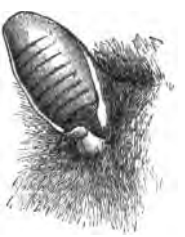
2. Cynonycteris minor.

Cynonycteris minor, *Dobson, J. A. S. B.* 1873, p. 203, pl. xiv. fig. 9.

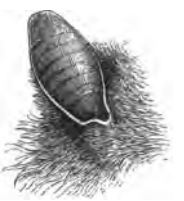
Ears smaller and proportionally narrower than in *C. amplexicaudata*, muzzle shorter.

The minute first upper premolar is closely wedged in between the canine and second premolar; in *C. amplexicaudata* it is separated by a narrow interval from both these teeth.

The distribution of the fur is somewhat similar to that of the preceding species, but the hair is much shorter on the wing-membrane,



C. amplexicaudata.



C. minor.

and almost absent from the backs of the tibiæ, from the adjoining portions of wing-membrane, and from the feet.

Length, head and body 3″·7, tail 0″·45, head 1″·55, ear 0″·68 × 0″·35, ear to tip of nostril 1″·3, eye to tip of nostril 0″·45, forearm 2″·8, thumb 0″·9, second finger 4″·4, fourth finger 3″·3, tibia 1″·05, foot and claws 0″·75.

Hab. Java.

Type in the collection of the Indian Museum.

EONYCTERIS.

Eonycteris, *Dobson, J. A. S. B.* 1873, p. 204.

Muzzle long, cylindrical; nostrils scarcely projecting; upper lip with a shallow vertical groove in front; index finger without a claw; thumb short, part of terminal phalanx included in the wing-membrane; metacarpal bone of second finger equal to the index finger in length; wings from the sides of the hairy back; wing-membrane from the base of the first toe; tail short, distinct, the base contained in the narrow interfemoral membrane.

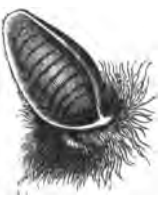
Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

First upper premolar minute; all the molars narrow and very slightly raised above the gum, as in *Macroglossus*; tongue very long and armed with long recurved papillæ as in that genus.

Eonycteris spelæa.

Macroglossus spelæus, *Dobson, P. A. S. B.* 1871, p. 106; *J. A. S. B.* 1871, p. 261, pl. x. figs. 3 & 4.
Eonycteris spelæa, *Dobson, J. A. S. B.* 1873, p. 204, pl. xiv. fig. 10.

Head long; muzzle narrow, cylindrical, abruptly narrowed in front of the eyes; nostrils with an intervening emargination, which also passes down to the lip; *tongue very long and pointed*; ears conical, with rounded tips.



E. spelæa.

Wings ample, from the sides of the hairy back; wing-membrane attached to the back of the foot, and extending to the base of the outer toe; thumb rather short, terminal phalanx longest, with its base included in the membrane; index finger of three phalanges, the terminal phalanx very short and wholly contained within the wing-membrane, not ending in a claw.

Body clothed with very short and thinly spread fur of a uniform dark brown colour. The fur of the head extends upon the face as far as the inner canthuses of the eyes, leaving the remaining portions naked; from the back it passes on to the humerus and forearm, covering half the length of the latter; behind, on each side, it covers a triangular portion of the interfemoral membrane, bounded laterally by the femur, and posteriorly by a line drawn from the knee-joint to the base of the free portion of the tail; beneath, the whole surface of the antebrachial membrane is covered with short hairs; laterally, the fur of the sides extends upon the wing-membrane as far as a line drawn between the elbow- and knee-joints, also outwards along the posterior margin of the forearm to the carpus, occupying a space varying in width from one inch behind the elbow to half an inch or less at the middle of the forearm; the under surface of the humerus and femur and half the length of the forearm are also hairy.

Tail about half an inch in length, half contained in the narrow interfemoral membrane as in *Cynonycteris*. On each side of and a little behind the anal opening two small, subcutaneous, gland-like bodies are placed.

These bodies are kidney-shaped, their convex margins directed out-

wards; and they are found in both male and female. In males in whom the testes have descended, one of these postanal glands forms on each side the posterior boundary of the temporary scrotum, which, in this situation only, is quite naked and covered by very thin skin.

The tongue is very long, pointed, and protrusible; in spirit specimens it can be drawn from the mouth for nearly half an inch without using any forcible extension; the anterior half of its surface is thickly covered with soft recurved papillæ, which increase very much in length towards the tip.

The teeth are very similar to those of *Macroglossus minimus*, except the first upper premolar, which is minute. The upper incisors are arranged triangularly; they are very small, scarcely raised above the level of the gum, and are separated from each other by regular intervals.

Length (of an adult ♂), head and body 4″·5, tail 0″·55, head 1″·55, ear 0″·75 × 0″·45, ear to tip of nose 1″·35, eye to tip of nose 0″·55, forearm 2″·85, thumb 0″·85, first finger 1″·8, second finger 4″·9, third finger 3″·8, fourth finger 3″·3, tibia 1″·2, foot and claws 0″·75.

Hab. Burma (Farm Caves, Moulmein).

Type in the collection of the Indian Museum, presented by the late Dr. F. Stoliczka.

MACROGLOSSUS.

Macroglossus, *F. Cuvier, Dents des Mammif.* p. 40 (1825); *Temm. Monogr. Mammal.* ii. p. 96 (1835–41); *Gray, Proc. Zool. Soc. Lond.* 1866, p. 64; *Peters, Monatsber. Akad. Wissensch. Berl.* 1867, p. 870; *Dobson, J. A. S. B.* 1873, p. 204.

Muzzle cylindrical, very long and narrow; nostrils not projecting; upper lip not grooved in front; tongue very long and attenuated; index finger with a distinct claw; metacarpal bone of second finger equal to or longer than index finger; wings from the sides, their points of attachment separated by a considerable interval from the spine; wing-membrane *from the base of the fourth toe*; tail very short.

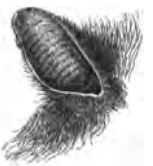
Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$. Upper incisors in a triangular series; molars very small and weak.

Macroglossus minimus.

Pteropus minimus, *Geoffroy, Ann. du Mus.* xv. p. 97 (1810).
Pteropus rostratus, *Horsfield, Zool. Research. in Java* (1825).
Macroglossus minimus, *Temminck, Monogr. Mammal.* i. p. 191, ii. p. 96 (1835–41); *Horsfield, Cat. Mammal. Mus. E. I. Comp.* p. 29 (1851); *Gray, Proc. Zool. Soc. Lond.* 1866, p. 64; *Peters, Monatsb. Akad. Wissensch. Berl.* 1867, p. 871; *Gray, Cat. Monkeys, Lemurs, & Fruit-eating Bats*, 1870; *Dobson, J. A. S. B.* 1873, p. 205.
Macroglossa minima, *Gray, Mag. Zool. Bot.* ii. p. 504 (1838).

Ears scarcely more than half the length of the head, narrow,

rounded at the tip; face abruptly narrowed in front of the eyes, muzzle very long, narrow, and cylindrical; nostrils not prominent, the slight groove between them not passing down to the upper lip; lower jaw projecting slightly beyond the upper jaw in front; eyes



Macroglossus minimus.

large; tongue very long, attenuated in its terminal third, covered with numerous long brush-like papillæ, capable of being protruded to a considerable distance from the mouth.

Interfemoral membrane very narrow, reduced to a scarcely perceptible band at the root of the tail, which in most specimens is so small as to be quite concealed by the fur.

Fur reddish brown, and much longer than in most of the species of *Pteropidæ*.

Upper incisors in a triangular series, very small, scarcely raised above the level of the gum, each tooth separated from the next by an interval, which is widest between the two central teeth. Upper premolars nearly equal in size, with single subacute cusps slanting forwards, each premolar separated by a considerable interval from the next. Molars with very narrow horizontal crowns, scarcely raised above the level of the gum.

Length (of an adult ♀ preserved in alcohol), head and body 2″·3, tail 0″·3, head 1″, ear to tip of nostril 0″·8, eye to tip of nostril 0″·4, ear 0″·6 × 0″·35, forearm 1″·55, thumb 0″·6, second finger 3″, fourth finger 2″·2, tibia 0″·6, foot and claws 0″·35.

Hab. From the Himalaya (Darjiling) through Burma to the Malay archipelago, and North and West Australia.

Suborder II. MICROCHIROPTERA.

Family II. RHINOLOPHIDÆ.

Rhinolophidæ, *Gray* (in part), *P. Z. S.* 1866, p. 81.
Rhinolophi, *Peters*, *MB. Akad. Berl.* 1871, p. 301.

Bats with well-developed foliaceous cutaneous appendages surrounding the nasal apertures, which are situated in a depression on the upper surface of the muzzle; with large, generally separated ears, without a tragus; with two phalanges in the middle finger, and an imperfect index finger without a phalanx; and with rudimentary premaxillary bones suspended from the nasal cartilages. The dental formula never exceeds

$$\text{Inc.}\ \tfrac{2}{4},\ \text{c.}\ \tfrac{1-1}{1-1},\ \text{pm.}\ \tfrac{2-2}{3-3},\ \text{m.}\ \tfrac{3-3}{3-3},\ =32\ \text{teeth.}$$

The number of premolars varies from $\frac{2-2}{3-3}$ to $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$. The upper incisors are quite rudimentary, placed at the extremities of the slender premaxillary bones in the centre of the space between the canines, and separated by an interval; the first upper premolar is minute; the molars are well developed, with acute W-formed cusps.

The very complicated nasal appendages consist of three parts, the homologies of which may generally be easily traced throughout the different genera and species:—(1) the horizontal nose-leaf, generally horseshoe-shaped, which more or less covers the sides and anterior extremity of the muzzle, and includes within its inner margin the nasal apertures, between or behind which a central process or ridge (2), the central nose-leaf or sella, is placed; while more posteriorly (3) the terminal or posterior nose-leaf arises vertically, or extends backwards between the ears.

The skull is large; and the nasal bones, which support the large nasal cutaneous appendages, are much expanded vertically and laterally. Tibia long and straight; fibula rudimentary. Females with two nipple-shaped appendages slightly in front of the pubis. Tail distinct, produced to the posterior margin of the interfemoral membrane.

These Bats are readily distinguished by the form of their nasal appendages, and by their rudimentary premaxillary bones supporting two minute, usually bilobed incisors; their molars are acutely tubercular, and enable them to crush with ease the hard cases of insects, especially Coleoptera, which, from remains found in their stomachs, seem to constitute a very large proportion of their food.

Their eyes are minute, and often with difficulty discovered in spirit specimens; the eyeball is extremely small, and the optic nerve reduced to the thickness of a very fine thread, contrasting remarkably with the development of the auditory and olfactory nerves in the same animals. The colour of the fur of these Bats varies very considerably in specimens of the same species, even from the same locality.

Hab. Asia, Malayana, Australia, Africa, Europe; they reach their highest development and are found in greatest variety and abundance in the tropical and subtropical regions of these continents.

Subfam. I. RHINOLOPHINÆ.

First toe with three, remaining toes with two joints each; iliopectineal spine not connected by bone with the antero-inferior surface of the ilium.

RHINOLOPHUS.

Rhinolophus, *Geoffroy, Desm. Nouv. Dict. d'Hist. Nat.* 1803, xix. p. 383; *Bonaparte, Saggio di una distrib. anim. vertebr.* 1831, p. 16.
Aquias, Phyllotis, Rhinolophus, *Gray, P. Z. S. L.* 1866, p. 81.

Nose-leaf very complicated, consisting of three distinct portions —anterior, central, and posterior; the anterior horizontal portion is horseshoe-shaped, usually angularly emarginate in front, containing within its circumference the nasal orifices and the central erect nasal process; the posterior nose-leaf is triangular, erect, with cells on its anterior surface; the central process rises between and behind the nasal orifices, is flattened anteriorly, and posteriorly sends backwards a vertical, laterally compressed process, which is either connected with the front surface of the posterior nose-leaf or free. Base of the outer side of the ear expanded, forming a large antitragus. Wings very large; metacarpal bone of fourth finger exceeding that of second in length. Basioccipital very narrow between auditory bullæ, in most species linear; cochleæ prominent, deeply grooved externally; foramen rotundum united with sphenoidal fissure.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Second lower premolar generally minute and placed outside the tooth-row; first upper premolar minute, pointed, standing in the tooth-row or lying in the outer angle between the closely approximated canine and second large premolar.

Range. All the continents of the eastern hemisphere—from Ireland to Japan, from South Africa to Australia.

In temperate regions the species hibernate in dry and warm hiding-places during the winter, not venturing abroad while any cold remains; in tropical and subtropical countries they are fond of frequenting hill-ranges; and many of the species are clothed with remarkably long and dense fur.

Synopsis of the Species.

A. The first upper premolar stands in the tooth-row; the second lower premolar, small but distinctly visible, placed in the outer angle between the first and third premolars or standing in the tooth-row.

a. Central nose-leaf or sella united posteriorly by a laterally flattened band (the posterior connecting process) with the upper and front surface of the base of the terminal nose-leaf.

a'. Sides of the horizontal base of the sella much expanded.

a''. Sides of the base of the sella folded inwards and backwards.

a'''. Summit of the vertical process of the sella broadly rounded off or truncate 1. *R. luctus*, p. 39.

b'''. Summit of the vertical process of the sella narrowly rounded off or subacute ..... 2. *R. trifoliatus*, p. 41.

b''. Sides of the base of the sella turned upwards, forming a cup-shaped cavity above and between the nasal apertures.

c'''. Antitragus separated posteriorly by a shallow notch; lower lip with a single groove; forearm 2''·25 ..... 3. *R. mitratus*, p. 42.

d'''. Antitragus separated by a deep angular notch; lower lip with three grooves; forearm 1''·85 ..... 4. *R. philippinensis*, p. 43.

b'. Sides of the horizontal base of the sella not expanded, scarcely concealing the nasal apertures.

c''. Upper margin of the posterior connecting process of the sella conjoined with the summit of the vertical process at the same level, and not exceeding it posteriorly in height.

e'''. Vertical process of the sella narrowed abruptly about the middle, summit rounded off; lower lip with a single vertical groove ..... 5. *R. pearsonii*, p. 43.

f'''. Sides of the vertical process of the sella straight, summit triangular; lower lip with three grooves..... 6. *R. rufus*, p. 44.

d''. Upper margin of the posterior connecting process exceeding the summit of the vertical process in height by a central projection.

g'''. Upper margin of the posterior connecting process forming a rounded angle.

α. Vertical process of the sella as broad as the horizontal part above the nostrils; ears longer than the head ..... 7. *R. macrotis*, p. 45.

β. Vertical process of the sella nar-

rower than the horizontal part; ears shorter than the head.
α'. Horseshoe-shaped nose-leaf broad, concealing the muzzle.. 8. *R. andamanensis*, p. 46.
β'. Horseshoe-shaped nose-leaf leaving the sides of the muzzle uncovered ..... 9. *R. affinis*, p. 47.
h'''. Upper margin of the posterior connecting process forming an acute projection.
γ. Sides of the vertical process of the sella parallel, summit broadly rounded off.
γ'. Terminal process of the posterior nose-leaf broad, forming an equilateral triangle ..... 10. *R. garoensis*, p. 48.
δ'. Terminal process of the posterior nose-leaf short and narrow.
α''. Antitragus separated by a deep angular notch.
α'''. Wings from the ankles; forearm 2" ..... 11. *R. petersii*, p. 49.
β'''. Wings from the ankles; forearm 1"·5..... 12. *R. minor*, p. 50.
γ'''. Wings from the metatarsus 13. *R. acuminatus*, p. 51.
β''. Antitragus separated by a shallow notch ..... 14. *R. euryale*, p. 51.
δ. Sides of the vertical process of the sella converging upwards.
γ''. Antitragus separated by a shallow notch ..... 15. *R. blasii*, p. 51.
δ''. Antitragus separated by a deep angular notch ..... 16. *R. hipposideros*, p. 52.
b. Central nose-leaf not united with the terminal nose-leaf; the posterior extremity of the connecting process received into a concavity in the front surface of the terminal leaf ..... 17. *R. cœlophyllus*, p. 53.
B. The first upper premolar quite external to the tooth-row, the second upper premolar close to the canine; the second lower premolar external to the tooth-row, very minute, scarcely elevated above the surface of the gum..... 18. *R. ferrum-equinum*, p. 53.

1. Rhinolophus luctus.

Rhinolophus luctus, *Temminck, Monogr. Mammal.* ii. p. 24, pl. xxx.; *Peters, MB. Akad. Berl.* 1871, p. 304.
Rhinolophus luctus, var. rufus, *Eydoux et Gervais, Voy. Favor. Zoologie*, 2e part. (1839).
Rhinolophus morio, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 257.
Rhinolophus perniger, *Hodgson, J. A. S. B.* xii. p. 414, xiii. p. 484; *Horsfield, Cat. Mamm. Mus. E.I. Comp.* (1851).
Aquias luctus, *Gray, P. Z. S.* 1847, p. 17; *id.* 1866, p. 81.

This fine species, by far the largest of the genus yet discovered,

is distinguished not only by its size, but also by the great development and peculiar form of the nasal appendages.

The base of the sella is expanded on either side, forming a long lobe, almost equal in size and similar in shape to the vertical process; this lobe is twisted on its base so as to lie with its upper surface partly on the central process of the sella, partly on the horseshoe-shaped nose-leaf. The horseshoe-shaped horizontal nose-leaf is very large, projecting in front and on either side beyond the upper lip. The posterior nose-leaf is developed in proportion to the other parts, and extends backwards between the ears. The lower lip is divided by a single deep vertical groove. The acutely pointed ears are enormous, even in proportion to the size of the animal; and the leaf-like antitragus is separated from the outer margin of the ear by a very deep angular incision.

The wing-membrane is greatly developed, and attached to the base of the outer toe; the interfemoral membrane is large, triangular behind; and the tail is wholly contained within it.

The fur of the body is very long and dense, usually of a jet-black colour, with gray tips, which suggested the specific name "*luctus*;" the colour, however, as in other *Rhinolophi*, varies considerably according to age, sex, and locality; and specimens have been obtained presenting every shade between reddish brown and intense black.

In the following Table of dimensions, No. 1 is an adult male from Darjeeling, of a dark reddish brown colour; Nos. 2 and 3 adult females from the same locality, the latter with a full-grown fœtus *in utero*.

	1.	2.	3.
	in.	in.	in.
Length, head and body	3·6	3·55	3·55
„ tail	2·25	2·6	1·9
„ head.....	1·4	1·45	1·35
„ ear (anteriorly)	1·5	1·65	1·55
„ second finger	4·25	4·7	4·55
„ fourth finger	3·75	4·2	3·75
„ tibia	1·45	1·5	1·45
„ foot	0·75	0·9	0·7
„ nose-leaf	1·3	1·3	1·2
Breadth of horseshoe	0·65	0·65	0·65

Hab. Himalaya, Nipal, Darjeeling, Khasia hills, Sikkim; Ceylon; Java; Sumatra; Philippine Islands.

Type in the collection of the Leyden Museum.

This species appears to be restricted to the highlands of the countries inhabited by it. In the Himalaya the late Captain T. Hutton has found it at an elevation of 5500 feet, "hanging from the roof of an outhouse in which rabbits and firewood were kept, looking, with its ample black wings folded round it as a cloak, somewhat like a large black cocoon." Captain Hutton's long residence in a region much frequented by this species afforded him rare opportunities for observing its habits; he continues:—"This fine species commences its flight rather early in the evening, and does

not soar high, like the smaller Bats in general, but remains below, at about twenty to thirty feet from the ground, wheeling, with a somewhat heavy and noiseless flight, around buildings and large trees in search of small beetles and other insects. Indeed I think it may be truly said of all the larger species of Bats that they hawk for prey in the lower regions of the atmosphere, while nearly all the smaller ones ascend: and the reason is, that while the flies and minute insects are in the higher regions, the large beetles and other large insects, of which the smaller Bats could make no use, are found below among the branches of the trees.

"This species appears usually to dwell in pairs, and does not associate in communities like some of the smaller *Rhinolophi*, though in a large cavern (affording ample room for them to hang apart) several pairs may sometimes be found. I have taken them from the roofs of outhouses and in wide caves in limestone rocks; but they appear to fly only during the warmer months of summer, remaining (at least such is the case at Mussooree) in a semitorpid state during the winter. It is possible, however, that in the warmer south-eastern climates of Sikhim and the Cossiah hills they may be active likewise in the winter."

2. Rhinolophus trifoliatus.

Rhinolophus trifoliatus, *Temminck, Monogr. Mammal.* ii. p. 27, pl. 31; *Wagner, Suppl. Schreb. Säugeth.* v. p. 663.
Aquias trifoliata, *Gray, P. Z. S.* 1847, p. 17; 1866, p. 81.

Very similar to *R. luctus* in structure and even in the colour and length of the fur; distinguished by its smaller size and by the subacute summit of the anteriorly flattened vertical process of the central nose-leaf, which in *R. luctus* is truncate. The free edge of the interfemoral membrane is straight; and the tip of the tail abruptly projects.

Length, head and body 2″·3, tail 1″·3, ear 1″, nose-leaf 0″·75 × 0″·45, forearm 2″, thumb 0″·3, second finger 3″·15, fourth finger 2″·85, tibia 0″·95, foot and claws 0″·5.

Hab. India (eastern coast), Java, Borneo.

Type in the collection of the Leyden Museum.

Rhinolophus luctus and *R. trifoliatus* were placed by Dr. J. E. Gray in a separate subgenus *Aquias*—on insufficient grounds however; for the form of the nose-leaf in these species differs only in the greater development of its parts, not in any important structure, from that of most species of this genus. As well might they have been separated on account of the remarkable length of the fur of the body.

On the same principle the subgenus *Phyllotis*, Gray, was formed for the reception of *Rhinolophus philippinensis*, Waterhouse (*vide infra*, p. 43), with which *R. mitratus*, Blyth, should necessarily be placed.

Fig. *a*.

3. Rhinolophus mitratus.

Rhinolophus mitratus, *Blyth, J. A. S. B.* xiii. p. 483, xxii. p. 409.

Ears large, with a broad well-developed antitragus separated from the outer margin by a shallow angular notch; anterior vertical process of the sella short, rounded off above, the posterior connecting process supporting its base only; horizontal base of sella between the nostrils much expanded, its base turned upwards, forming a deep cup-like cavity; terminal nose-leaf triangular, acutely pointed,

Fig. *b*.

extending backwards between the ears (figs. *a*, *b*). Lower lip with a single groove.

Fur above brown, paler at the base; beneath a lighter shade of the same colour.

Length, head and body 2″·4, tail 1″·6, ear (anteriorly) 1″, forearm 2″·25, second finger 3″·4, fourth finger 2″·8, tibia 1″, foot and claws 0″·5.

Hab. Central India (Chaibása).

Type in the collection of the Indian Museum, Calcutta.

This species resembles the next very closely in the form of the central nose-leaf; but it may be readily distiuguished by the much shorter and broader terminal nose-leaf, by the form of the outer margin of the ear, by the single groove in the lower lip, and also by its greater size.

4. Rhinolophus philippinensis.

Rhinolophus philippinensis, *Waterhouse*, *P. Z. S.* 1843, p. 68; *Peters*, *MB. Akad. Berl.* 1871, p. 305.
Phyllotis philippensis, *Gray*, *P. Z. S.* 1866, p. 81.

Ears large, subacute, the upper third of the outer margin slightly concave; antitragus large and deep; horizontal horseshoe-shaped nose-leaf broad, concealing the muzzle; base of the central leaf expanded, with turned-up edges, forming a deep cup between and above the nostrils; vertical process of the central leaf broad, not diminishing in width upwards, truncate above; posterior vertical connecting process convex on upper margin, not so high as the summit of the central leaf; posterior nose-leaf long, narrow, and acute. Lower lip with three grooves.

Wings to the ankles. Interfemoral membrane square behind, extreme tip of tail alone projecting.

Fur above and beneath dark brown, slightly paler beneath.

Length (of an adult ♂ preserved in alcohol, the type), head and body 1″·95, tail 1″·1, ear 1″, antitragus 0″·5 × 0″·3, forearm 1″·85, thumb 0″·32, second finger 2″·7, fourth finger 2″·1, tibia 0″·85, foot and claws 0″·35.

Hab. Philippine Islands.

Type in the collection of the British Museum.

Fig. *a*.

5. Rhinolophus pearsonii.

Rhinolophus pearsonii, *Horsfield*, *Cat. Mamm. Mus. E.I. Comp.* (1851), p. 33.
Rhinolophus larvatus, *A. Milne-Edwards*, *Mammif. du Tibet*, 1872, pp. 248, 249, pl. xxxvii. fig. i.; xxxvii^{c}. fig. i.
Rhinolophus yunanensis, *Dobson*, *J. A. S. B.* 1872, p. 336.

Ears large, acutely pointed; outer margin deeply hollowed out beneath the tip; antitragus long, separated from the outer margin of the ear by an acute angular notch. Nose-leaf large; horseshoe broad, projecting laterally and in front beyond the upper lip so as to completely conceal the muzzle when viewed from above; base of the sella between the nostrils moderately broad, the vertical portion

maintaining the same width for half its height, then abruptly narrowing and rounded off above, meeting at the same level (as in *R. rufus*) the upper margin of the connecting process, which does not

Fig. *b*.

rise above it; terminal leaf short and broadly triangular, sides slightly convex, almost straight (figs. *a*, *b*). Lower lip with a single groove.

Wings remarkably wide; wing-membrane from the ankle. Tail short and contained, except the extreme tip, within the interfemoral membrane, the posterior free margin of which is concave.

Fur uniformly dark brown above and beneath, *very long and dense*.

Of three well-preserved specimens in alcohol, obtained by Dr. Anderson during the first Yunan expedition (two males and one female), the measurements of all parts, except the tail, correspond to the twentieth of an inch. In one male the tail measures 1″·1.

Length, head and body 2″·7, tail 0″·9, head 1″, ear 1″, antitragus 0″·4, nose-leaf 0″·7 × 0″·45, forearm 2″·2, thumb 0″·35, second finger 3″·3, fourth finger 3″, tibia 1″, foot and claws 0″·5.

Hab. India (Masuri, Darjiling, Khasia and Garo hills, Tupai Mukh), Tibet, Yunan (Hotha).

This Bat (easily recognized by the great length of its fur, in which it resembles *R. luctus*) appears to be an inhabitant of very elevated hill-countries, extending from the N.W. Himalaya, Tibet, and Assam to the mountain-tracts lying between Burma and China.

The type has lain for many years in the collection of the East-India House, packed away among other objects of natural history, until very recently, quite inaccessible to any one. This, and the very imperfect description by Mr. Horsfield, have led to other names being applied to this very well-marked species which I immediately recognised on examining the type.

6. Rhinolophus rufus.

Rhinolophus rufus, *Peters, MB. Akad. Berl.* 1861, p. 710.
Rhinolophus euryotis, *Peters* (*non Temminck*), *l. c.* 1861, p. 710.
Rhinolophus arcuatus, *Peters, l. c.* 1871, p. 305.

Ears large, as long as the head, very acute; antitragus separated from the outer margin by a deep acute-angled emargination. Nose-leaf large, the horseshoe concealing the muzzle, deeply divided in front; the central erect process of the sella rather broad, with

parallel sides and rounded summit, meeting the superior margin of the posterior connecting process (which is not raised above it) at the same level. Lower lip with three grooves.

Wing-membrane from the tarsus.

Fur reddish brown or dark brown above and beneath.

Length, head and body 3″, tail 1″, head 1″, ear 1″, nose-leaf 0″·8×0″·5, forearm 2″·1, second finger 3″·2, fourth finger 2″·7, tibia 1″·1, foot and claws 0″·5.

Hab. Philippine Islands (Luzon).

Type in the collection of the Berlin Museum.

R. arcuatus, Peters, differs from *R. rufus* in size only, and is probably a local form of the same, as *Scotophilus luteus*, Blyth, and *S. temminckii*, Horsf.*

Fig. *a*.

7. Rhinolophus macrotis.

Rhinolophus macrotis (*Hodgson*), *Blyth, J. A. S. B.* xiii. p. 485.

Ears very large in proportion to the size of the animal, subacutely pointed; outer margin slightly concave immediately beneath the tip, then convex, separated below from the well-developed antitragus by a moderately deep notch; nose-leaf large, horseshoe portion concealing the upper lip, as in *R. luctus*; anterior flat surface of the

* Difference in size alone cannot be considered a distinguishing mark of species; and even differences in the comparative measurements of parts, where perfect similarity exists in all other respects, must be taken with great caution. Thus I have occasionally found the comparative lengths of the metacarpal bones and phalanges of the fingers different in the wings of the same animal; and in immature animals the bones of the fingers are always comparatively shorter than those of other parts.

Although specimens of the same species, differing in size in no appreciable degree, though inhabitants of far distant countries, are to be found in all large collections, yet specimens of what must evidently be considered the same species are occasionally found in the same country, which differ in being either larger or smaller than usual. This is, I believe, due to two causes:—first, real difference in size, resulting from different circumstances of different individuals, exceptionally favourable circumstances (*e.g.* abundance of suitable food and comfortable quarters) leading to the highest development, while opposite conditions lead to arrest of development; and, secondly, apparent differences, resulting from comparing specimens of animals of different ages, the smaller of which appear really adult from the condition of the extremities of the bones. But although an unossified condition of the extremity of the bones is most useful in showing that a given specimen represents an immature animal, an apparently ossified condition by no means proves that an animal is quite full-grown.

central leaf broad, maintaining the same breadth from the horizontal part between the nostrils to its rounded termination above; upper edge of the posterior vertical process obtusely conical, equalling or

Fig. *b*.

scarcely exceeding in height the anterior process; terminal process of the posterior nose-leaf ovate, subacutely pointed (figs. *a*, *b*).

Wing-membrane from the ankles; interfemoral membrane square or slightly triangular behind; extreme tip of tail free.

Length (of an adult ♂ preserved in alcohol), head and body 1″·7, tail 0″·8, head 0″·75, ear 0″·85 × 0″·55, antitragus 0″·25, nose-leaf 0″·5 × 0″·3, forearm 1″·6, second finger 2″·2, fourth finger 2″, thumb 0″·25, tibia 0″·7, foot and claws 0″·35.

Hab. Himalaya (Nipal, Masuri).

The ears and nasal membranes are in this small species larger in proportion to the size of the animal than in any other species of the genus.

Type in the collection of the Indian Museum, Calcutta.

Fig. *a*.

8. **Rhinolophus andamanensis.**

Rhinolophus andamanensis, *Dobson, J. A. S. B.* 1872, p. 337.

Like *R. affinis* generally; but the anterior horizontal horseshoe-shaped membrane is very broad, completely concealing the muzzle when viewed from above, as in *R. pearsonii*; the posterior terminal leaf is also much longer, produced backwards between the ears, and not concave on the sides as in *R. affinis* (fig. *a*). The thumb is also much longer.

Fur bright reddish brown above and beneath.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5, tail 0″·9, head 1″·05, ear 0″·85, nose-leaf 0″·75, breadth of horseshoe 0″·45, forearm 2″·05, thumb 0″·45, second finger 3″·2, fourth finger 2″·5, tibia 1″.

Hab. Southern Andaman Island.

Type in the collection of the Indian Museum, Calcutta; presented by Mr. Homfray, Assistant Superintendent, Port Blair.

9. Rhinolophus affinis.

Rhinolophus affinis, *Horsfield, Zool. Researches in Java* (1824); *Temminck, Monogr. Mamm.* ii. p. 31 (1835).
Rhinolophus rouxii, *Temminck, l. c.* p. 30 *a* et *b*.

Ears somewhat shorter than the head, acute, the outer margin not deeply hollowed out beneath the tip; antitragus large, separated by a deep angular incision. Horizontal horseshoe-shaped membrane moderate, not extending so far in front or laterally as to conceal the sides of the muzzle when viewed from above, yet larger than in *R. ferrum-equinum*; vertical front surface of the sella maintaining the same width upwards, rounded off above, exceeded in height by the summit of the laterally flattened connecting process, which forms a rounded-off angle from which a few hairs arise; terminal nose-leaf rather short, the subacute triangular terminal process with slightly concave sides. Lower lip with three distinct grooves.

Wings from the ankles or from the tibia higher up. Interfemoral membrane square or slightly angular behind; extreme tip of the tail projecting.

Fur variable in colour, greyish-brown or reddish-brown or even golden orange-brown, the hairs darker towards their extremities. *R. cinerascens*, *fulvidus*, et *rubidus*, Kelaart, were founded on these differences in the colour of the fur.

The following Table exhibits the relative measurements of the type specimen, of a specimen compared by me with the type, and of the types of Kelaart's species referred to above. These measurements vary slightly, but not more than in specimens of other species of *Rhinolophus* from different localities and of different ages.

	Head and body.	Tail.	Head.	Ear.	Antitragus.	Nose-leaf.	Breadth of nose-leaf.	Forearm.	Thumb.	Second finger.	Second metacarpal.	Ditto, first phalanx.	Ditto, second phalanx.	Fourth finger.	Fourth metacarpal.	Ditto, first phalanx.	Ditto, second phalanx.	Tibia.	Foot and claws.
R. affinis, Horsf. (type). Java	...	0·9	...	0·75	0·28	...	...	1·95	0·35	3·0	1·45	0·55	1·0	2·4	1·3	0·4	0·5	0·95	0·48
R. affinis, Dobson. Sylhet	2·3	0·9	0·95	0·72	0·28	0·55	0·35	2·1	0·35	3·25	1·45	0·6	1·2	2·7	1·6	0·5	0·6	0·95	0·48
R. rubidus, Kelaart (type). Ceylon	2·45	0·9	0·9	0·8	0·28	0·6	0·32	1·9	0·35	...	1·35	0·55	0·85	...	1·4	0·45	0·45	0·85	0·45
R. fulvidus, Kelaart (type). Ceylon	2·0	0·7	0·85	0·7	...	0·6	0·32	1·8	0·35	2·7	...	...	...	2·2	...	...	...	0·8	...
R. cinerascens, Kelaart (type). Ceylon	2·2	0·95	0·95	0·75	...	0·55	0·35	2·15	0·35	3·4	...	...	...	2·7	...	...	...	0·95	...

The types of *R. rubidus* and *fulvidus*, from long soaking in alcohol, have become very flaccid; and the measurements of the soft parts are consequently greater now than when first obtained by Dr. Kelaart.

Hab. Peninsula of India, from the Himalaya to Cape Comorin (inhabiting hill-tracts); Ceylon, Burma, Sumatra, Java, Borneo.

Type in the collection of the Museum of the E.I. Comp. at South Kensington.

Fig. *a*.

10. Rhinolophus garoensis.

Rhinolophus garoensis, *Dobson*, *J. A. S. B.* 1872, p. 337.

Ears acutely pointed, with a large antitragus as in *R. affinis*. Anterior vertical process of the sella maintaining the same breadth upwards and rounded off above, considerably exceeded in height by the upper edge of the connecting process, which develops a long

Fig. *b*.

acutely pointed projection; terminal portion of the posterior leaf broad, with straight sides, forming almost an equilateral triangle (figs. *a*, *b*).

Wing-membrane from the ankles; interfemoral membrane square behind; extreme tip of the tail free.

Fig. *c*.

The second lower premolar stands in the tooth-row, and, although much smaller than the first premolar, is not minute (fig. *c*).

The type of this species was obtained by Major H. H. Godwin-Austen in the Garo hills; and the following measurements show it to be probably the smallest known species of the genus. Length, head and body 1″·5, tail 0″·7, head 0″·6, ear 0″·5, antitragus 0″·2, nose-leaf 0″·4 × 0″·2, forearm 1″·3, thumb 0″·2, second finger 2″, fourth finger 1″·7, tibia 0″·6, foot and claws 0″·3.

Hab. Garo hills, Assam; Himalaya (Masuri).

This small species is closely allied to *R. minor*, Horsfield, from which the broad terminal portion of the nose-leaf, not emarginate on the sides, distinguishes it.

Type in the collection of the Indian Museum, Calcutta.

Fig. *a*.

11. Rhinolophus petersii.

Rhinolophus petersii, *Dobson, J. A. S. B.* 1872, p. 337.

Ears acutely pointed, with an emargination immediately beneath the tip; antitragus large, separated from the outer margin by a deep angular incision. Nose-leaf as in *R. acuminatus*, except the upper

Fig. *b*.

border of the posterior connecting process, which is much less acute. Lower lip with three vertical grooves (figs. *a*, *b*).

Wings from the ankles; interfemoral membrane slightly triangular behind; extremity of the tail free, projecting abruptly one tenth of an inch beyond the membrane.

Fur dark brown above, greyish brown beneath.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5, tail 1″, ear 0″·75, antitragus 0″·3, forearm 2″, thumb 0″·4, second finger 2″·8, fourth finger 2″·5, tibia 0″·9, foot and claws 0″·5, nose-leaf 0″·55 × 0″·35.

Hab. India, precise locality unknown.

Type in the collection of the Indian Museum, Calcutta.

12. Rhinolophus minor.

Rhinolophus minor, *Horsfield, Zoolog. Researches in Java* (1824); *Temminck, Monogr. Mammal.* ii. p. 35 (1835–41).
Rhinolophus pusillus, *Temminck, l. c.* p. 36; *Peters, MB. Akad. Berl.* 1871, p. 309.
Rhinolophus cornutus, *Temminck, l. c.* p. 37.
Rhinolophus borneensis, *Peters, MB. Akad. Berl.* 1861, p. 709.

Ears slightly shorter than the head, subacutely pointed, concave for a short distance beneath the tip; antitragus large, separated by a deep angular notch; horizontal nose-leaf as in *R. affinis*; vertical process of the sella maintaining the same width upwards, its summit rounded off, much exceeded in height by the upper margin of the posterior connecting process, which forms an acute projection; posterior nose-leaf small, terminating in a short narrow process. Lower lip with three vertical grooves.

Wings from the ankles; interfemoral membrane square or slightly concave behind; tip of the tail scarcely projecting. Fur light brown above, greyish brown beneath.

In the type specimen the second lower premolar stands in the tooth-row, and is visible without the aid of a lens. In other specimens, which differ in no other respect from the type, I have found this tooth external to the tooth-row, as in most species of this genus, while other specimens agree with the type in having the second lower premolar in the tooth-row. In one specimen I have observed this tooth partially external. I therefore regard this character as a variable one, in this species at least.

The upper margin of the posterior connecting process of the sella is more acute in some specimens of this species than in others; and the form of the posterior free margin of the interfemoral membrane varies, as in *R. affinis*, also, from being slightly concave to square, or even to a slight angularity.

I cannot, therefore, distinguish *R. pusillus* et *cornutus*, Temm., from this species.

The following Table exhibits the measurements of the type specimen and of other specimens which have been compared with it. The position of the second lower premolar is noted in each.

	Head and body.	Tail.	Head.	Ear.	Forearm.	Thumb.	Second finger.	Second metacarp.	Ditto, 1st phal.	Ditto, 2nd phal.	Fourth finger.	Fourth metacarp.	Ditto, 1st phal.	Ditto, 2nd phal.	Tibia.
Type (skin). Java. Pm. in tooth-row	...	0·75	...	0·52	1·45	0·2	2·0	1·0	0·4	0·6	1·8	1·05	0·35	0·4	0·6
In alcohol. Pegu. Pm. external	1·7	0·65	0·65	0·52	1·4	0·2	2·0	...	...	...	1·8	...	...	...	0·55
In alcohol. Yunan. Pm. external	1·75	0·85	0·7	0·6	1·5	0·25	2·25	1·1	0·45	0·7	2·05	1·15	0·4	0·5	0·6

Hab. Southern Asia (Japan, Borneo, Java, Sumatra, Burma, Yunan).

Type in the collection of the Museum of the East-India Company, South Kensington.

13. Rhinolophus acuminatus.

Rhinolophus acuminatus, *Peters, MB. Akad. Berl.* 1871, p. 308.

Ears somewhat shorter than the head, acute though not attenuated at the tip; antitragus large, separated by a deep angular incision. Horizontal horseshoe-shaped nose-leaf not so broad as the muzzle; vertical part of the sella maintaining almost the same breadth upwards and rounded off above, exceeded considerably in height by the upper margin of the posterior connecting process, produced into an acute point as in *R. euryale*, though not so long; posterior terminal leaf short, terminal process consisting of a short narrow projection. Lower lip with three vertical grooves.

Wings from the metatarsus almost from the base of the toes. Interfemoral membrane deeply concave behind; tail wholly contained within the membrane.

Fur dark brown above, paler beneath.

Length, head and body 2″·1, tail 0″·9, ear 0″·7, antitragus 0″·25, forearm 1″·9, thumb 0″·3, second finger 2″·7, fourth finger 2″·4, tibia 0″·8, foot and claws 0″·4, nose-leaf 0″·5 × 0″·32.

Hab. Java. Type in the collection of the Berlin Museum.

14. Rhinolophus euryale.

Rhinolophus euryale, *Blasius, Archiv für Naturg.* i. p. 49; *Fauna Deutschl.* p. 35 (1855); *Peters, MB. Akad. Berl.* 1871, p. 308.

Ears acutely pointed but not attenuated at the tip; the antitragus separated from the outer margin by an obtuse angle, as in *R. ferrum-equinum*; nose-leaf small; sides of the vertical portion of the sella straight, summit rounded, considerably exceeded in height by the upper margin of the connecting leaf, which develops a long acutely pointed process; posterior terminal leaf moderately long, concave on the sides towards the subacute extremity.

Interfemoral membrane square behind; the extreme tip of the tail projecting. Wings from the tibiæ above the ankles.

Above dark reddish brown, beneath light brown.

Length, head and body 2″, tail 0″·9, ear 0″·8, forearm 1″·8, thumb 0″·3, second finger 2″·8, fourth finger 2″·1, tibia 0″·75, foot and claws 0″·35, nose-leaf 0″·5 × 0″·28.

Hab. Asia Minor (Syria), Southern Europe, and Northern Africa.

15. Rhinolophus blasii.

Rhinolophus clivosus, *Blasius (non Cretschm.), Fauna Deutschl.* p. 33, figs. 10, 11 (1857).

Rhinolophus blasii, *Peters, MB. Akad. Berl.* 1866, p. 17, & 1871, p. 309.

Ears shorter than the head, acutely pointed, slightly attenuated towards the tips, but much less so than in *R. ferrum-equinum*; antitragus separated from the outer margin by a very shallow emargination. Horizontal horseshoe-shaped membrane small, leaving the front and sides of the muzzle uncovered; vertical process of the sella short, abruptly narrowed at half its height, and terminating in a subacute point, its upper half thus presenting a triangular surface anteriorly; upper margin of the posterior connecting process forming a long narrow acutely pointed projection, extending high above the summit of the vertical process of the sella; terminal nose-leaf moderately large, sides of the terminal triangular process slightly concave. Lower lip with a single groove. Wings from the ankles; interfemoral membrane square behind; extreme tip of tail projecting.

Fur reddish brown above, light greyish brown beneath.

Length (of an adult ♂ preserved in alcohol), head and body 1″·9, tail 1″, ear 0″·7, antitragus 0″·3, forearm 1″·8, thumb 0″·28; second finger—metacarp. 1″·15, 1st phal. 0″·55, 2nd phal. 1″; fourth finger—metacarp. 1″·25, 1st phal. 0″·4, 2nd phal. 0″·5; tibia 0″·75, foot and claws 0″·35.

Hab. Asia Minor (Palestine); Northern Africa; Southern Europe.

Type in the collection of the Berlin Museum.

16. Rhinolophus hipposideros.

Noctilio hipposideros, *Bechstein, Naturg. Deutschl.* p. 1194 (1801).
Rhinolophus hippocrepis, *Hermann, Observ. Zoolog.* p. 18 (1804).
Rhinolophus bihastatus, *Geoffroy, Descript. de l'Egypte,* ii. p. 132 (1812).
Rhinolophus minimus, *Heuglin, Säugethiere N.Ost-Afrika's,* p. 6 (1861).

Ears nearly as long as the head, very acutely pointed; outer margin of the conch deeply concave beneath the tip; antitragus separated by a deep angular notch. Horizontal horseshoe-shaped nose-leaf not concealing the sides of the muzzle, finely crenate along its outer free margin; vertical process of the sella long, diminishing gradually in width from the base upwards, its anterior surface thus presenting the form of an isosceles triangle with a narrowly rounded-off vertical angle; the upper edge of the posterior connecting process forms a narrow subacute projection, scarcely exceeding the summit of the anterior process of the sella; posterior nose-leaf long, its terminal process shaped like the vertical process of the sella. Lower lip with a single vertical groove.

Wings from the ankles; interfemoral membrane angular behind, the extreme tip of the tail alone projecting.

Fur light brown above, beneath light greyish brown.

Length (of an adult ♂ preserved in alcohol), head and body 1″·55, tail 1″·15, head 0″·65, ear 0″·6, forearm 1″·5, second finger 2″·2, fourth finger 2″, tibia 0″·7, foot and claws 0″·3, nose-leaf 0″·5 × 0″·3.

Hab. Asia Minor (Caucasus range); Southern and Middle Europe (Dalmatia, Italy, Southern Russia, Hungary, Switzerland, Northern Germany, France, England, Ireland).

17. Rhinolophus cœlophyllus.

Rhinolophus cœlophyllus, *Peters, P. Z. S.* 1866, p. 426, pl. xxxiv.

Ears large, with narrow acute tips projecting outwards; antitragus large, separated by an angular emargination from the outer margin of the ear; horseshoe large; horizontal margins of central nose-leaf triangular, small; erect portion rather short, with parallel sides and rounded summit meeting the connecting vertical process at the same level; this process is thick and long, its posterior portion is not connected with the posterior terminal leaf, but is received into an opening in its front surface; the posterior leaf is shortly triangular in outline, formed of very thick integument, and its surface is marked by a crucial aperture leading into a deep cavity lined with hairs; the lower part of this aperture receives the posterior extremity of the connecting nose-leaf. The surface of the terminal leaf is covered with rather long hairs, its inferior surface is convex and rests on the forehead, which is naked in this situation. Chin marked with three small vertical grooves.

Wings from the ankles or from the tibiæ a short distance above. Interfemoral membrane narrow, concave or straight behind; tip of tail projecting.

The second upper premolar is separated from the canines by a space, in the midst of which the small first premolar stands; the second lower premolar is minute and external to the tooth-row.

Fur, above white at the base, with brown extremities, beneath pale brownish white.

Length, head and body 2″, tail 0″·8, ear 0″·8, forearm 1″·85, thumb 0″·3, second finger 2″·8, fourth finger 2″·2, tibia 0″·85, foot and claws 0″·4, nose-leaf 0″·5 × 0″·4.

Hab. Moulmein; Isagine, Upper Burma.

Type in the collection of the Berlin Museum.

18. Rhinolophus ferrum-equinum.

Vespertilio ferrum-equinum, *Schreb. Säugeth.* i. p. 174 (1775); *Erxleb. Syst. Reg. Anim.* p. 154 (1777); *Gm. Lin.* p. 50 (1788).
Rhinolophus unihastatus, *Geoffroy, Ann. du Muséum*, xx. p. 257.
Rhinolophus capensis, *Lichtenstein, Verz. Zool. Mus. Berl.* p. 4.
Rhinolophus geoffroyi, *Smith, Zool. Journ.* iv. p. 433.
Rhinolophus ferrum-equinum, *Leach, Zool. Miscell.* iii. p. 2; *Jenyns, Brit. Verteb.* p. 19; *Bell, British Quadrup.* p. 68 (wdct.) (1837); *Blasius, Fauna Deutschl.* p. 31 (1857); *Peters, MB. Akad. Berl.* 1871, p. 310; *Dobson, P. A. S. B.* 1872, p. 208.
Rhinolophus nippon, *Temm. Monogr. Mammal.* ii. p. 30 *a*.
Rhinolophus tragatus, *Hodgson, J. A. S. B.* iv. p. 699.
Rhinolophus clivosus, *Rüppell, Atlas, Reis. n. Afrika*, p. 47; *Peters, MB. Akad. Berl.* 1866, p. 16, 1871, p. 311.
Rhinolophus fumigatus, *Rüppell, Mus. Senckenberg.* iii. p. 132 (*vide Peters, l. c.* 1871, p. 311); *Peters, C. v. der Decken Reis. in Africa, Säugeth.* pl. 2. fig. 3.
Rhinolophus deckenii, *Peters, MB. Akad. Berl.* 1867, p. 705.

Ears large, very acutely pointed and attenuated towards the tip;

outer margin deeply concave in its upper third; antitragus separated by a shallow notch from the outer margin. Anteriorly flattened surface of the central nose-leaf narrow, rounded above, exceeded considerably in height behind by the posterior vertical membrane, which, viewed laterally, is obtusely conical, and clothed with a few fine straight hairs; triangular terminal portion of the posterior nose-leaf emarginate on the sides towards the apex, forming a narrow, acutely pointed terminal process. Wing-membrane attached to the ankles; interfemoral membrane slightly triangular behind; tip of tail free; calcanea well developed.

The second upper premolar is close to the canine, the first premolar is very minute and placed quite outside the tooth-row; the second lower premolar is not discernible in some specimens, and in others always detected with difficulty, even with the aid of a lens; it lies in the outer angle between the first and second premolars, which, in this species, are very close together.

From a comparison of the types of *R. tragatus*, Hodgson, in the Indian Museum with three specimens of *R. ferrum-equinum*, Schreber, from Europe, well preserved in spirit, no doubt remains as to the identity of these species*.

The following Table of dimensions gives in the first and second columns measurements of two specimens of *R. ferrum-equinum* from Europe, in the third and fourth those of two specimens of *R. tragatus* in the Indian Museum.

	1.	2.	3.	4.
	in.	in.	in.	in.
Length, head and body	2·45	2·35	2·5	2·4
„ tail	1·45	1·55	1·5	1·5
„ head	0·95	1·0	1·0	1·0
„ ear (anteriorly)	0·85	0·9	0·9	0·9
„ nose-leaf	0·6	0·6	0·55	0·6
Breadth of nose-leaf	0·35	0·35	0·35	0·35
Length, thumb	0·3	0·3	0·35	0·3
„ second finger	3·5	3·6	3·55	3·5
„ fourth finger	2·8	2·9	2·9	2·8
„ forearm	2·2	2·25	2·25	2·25
„ tibia	0·95	0·9	1·0	0·95
„ foot and claws	0·5	0·5	0·5	0·45

Hab. Europe; North Africa; Asia Minor; Syria; Himalaya, Nipal, Masuri.

* In Blyth's description of *R. tragatus*, Hodgs. (Journ. As. Soc. Beng. vol. xiii. p. 485), he remarks that the uppermost peak of the posterior nose-leaf "is inconspicuous, being almost concealed by the fur of the forehead." The specimens thus described are still in the Indian Museum; and the "inconspicuous" condition of the hinder nose-leaf is evidently due to original imperfect preservation.

Subfam. II. PHYLLORHININÆ.

Toes equal, of two phalanges each; ilio-pectineal spine united by a bony isthmus with a process derived from the antero-inferior surface of the ilium, forming a large preacetabular foramen*.

Synopsis of Genera.

A. Horizontal anterior nose-leaf horseshoe-shaped; metacarpal bone of index finger equal to or scarcely exceeding the metacarpal of the second finger in length.
  a. Centre of the upper surface of the horseshoe supporting the base of a horizontal crest extending backwards between and above the nasal apertures.
    a'. External margin of the ear commencing near the posterior commissure of the eyelids ..... 1. **Triænops**, p. 56.
    b'. External margin of the ear commencing at a point distant from and on a much lower level than the eye ..... 2. RHINONYCTERIS†.
  b. Centre of the upper surface of the horseshoe uncovered; no horizontal crest extending backwards between and above the nasal apertures ..... 3. **Phyllorhina**, p. 58.
B. Horizontal anterior nose-leaf lobate; metacarpal bone of index finger very long, extending to the first phalanx of the second finger .. 4. **Cœlops**, p. 74.

* The bridge thus formed between the spinous process of the *eminentia ilio-pectinea* and the antero-inferior spine of the ilium forms the inferior boundary of a large foramen, larger than the obturator opening, which lies behind and in a plane slightly inferior to it. This foramen occurs only in the species of Bats included in the genera of *Phyllorhininæ*, and has not yet been observed in any other species of Mammal. This osseous connecting-arch evidently greatly strengthens the pelvis (which is so remarkably weak in Chiroptera); but we do not yet know whether there be any corresponding difference in the habits of the animals possessing this peculiar structure which may require additional strength in the pelvis.

The Bats of this subfamily are also remarkably characterized by the equal number of phalanges in the toes, differing in this respect from all other species of Chiroptera except *Thyroptera tricolor*, a Bat possessing peculiar accessory organs of prehension—suctorial disks attached to the thumbs and feet, which render the action of the toes in suspending the body quite secondary.

† The only species known, *R. aurantia*, Gray, has been found as yet in Australia alone.

TRIÆNOPS.

Triænops, *Dobson, J. A. S. B.* xl. (1871) p. 455.

Nose-leaf horseshoe-shaped in front, tridentate behind; horseshoe-shaped portion consisting of two laminæ, of which the overlying one is deeply emarginate in front, with the sides of the emargination turned upwards and supporting the base of a longitudinal horizontal crest, extending backwards between and above the nasal apertures; hinder erect portion of the nose-leaf with one cell in the centre of its base, the entrance to which is guarded by a lanceolate process, with cells on the sides of its front surface, and one on each side behind immediately above the eye. Ears without an antitragus, as in *Phyllorhina*, the outer margin of the ear-conch arising from the posterior commissure of the eyelids.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

First upper premolar minute, with a slightly concave crown, placed outside the tooth-line.

Fig. *a*.

1. Triænops persicus.

Triænops persicus, *Dobson, J. A. S. B.* xl. p. 455, pl. xxviii.; *id.* "*On the Osteology of*," *l. c.* xli. 1872, pp. 136–142, pl. vi. figs. 1–14.

Head long; muzzle broad, obtuse, flattened laterally; ears nearly as broad as long, funnel-shaped, with acutely pointed tips; the outer margin commences in a narrow fold of skin arising from the posterior angle of the eyelids, which, passing backwards and slightly downwards for about 0·1 inch, rises abruptly to a height of 0·2 inch, forming the outer side of the external ear; the inner margin is convex forwards, and rises to about the same height; at a short distance behind it is interrupted by a sudden emargination, which is succeeded by a triangular elevation of the rim of the ear, forming the tip, which projects outwards owing to the concavity of the outer side of this triangle.

The nasal appendages are very complicated, and difficult to describe. Their form will be better understood by an examination of

the woodcut above, in which the curiously formed ears are also well shown (fig. *a*).

Fig. *b*.

The wings present some remarkable peculiarities of structure. From the outer side of the proximal extremity of the terminal phalanx of the third finger a small process of bone arises, with an inclination forwards and outwards, and terminates by an obtuse point in the wing-membrane, in which it is included (fig. *b*). The distal extremity of the same phalanx is very shortly bifid, as in most Rhinolophine Bats; but the terminal phalanx of the fourth finger ends in a single point.

Wing-membrane attached to the tibia a short distance above the ankle; feet long, slender; toes equal in length, armed with long and strong claws; tail included in the interfemoral membrane, the extreme tip alone free.

On the upper surface the fur is very pale buff, almost white, with light sepia tips, darkest on the back of the neck, along the anterior margin of the scapulæ, and between the shoulders; towards the root of the tail of a yellowish tinge throughout; beneath, wholly very pale buff or dirty yellowish white, cutaneous system of the same colour. The fur is everywhere long and dense; in front it covers the posterior surface of the hinder nose-leaf, exceeding in length the height of the trident-shaped crest. Behind the fur of the back extends on to the base of the interfemoral membrane nearly as far as the end of the second caudal vertebra; on the wing-membrane its extent is very limited; beneath, the wing-membrane is covered with hair nearly as far as a line drawn from the middle of the humerus to the middle of the femur, but the humerus and femur are completely naked beyond the body; the distribution of fur on the under surface of the interfemoral membrane is similar to that above.

The anterior upper premolar is minute with a flattened crown, and is placed outside the line of teeth; the upper and lower incisors are bilobed; the upper canines have large cusps at their bases posteriorly.

	in.
Length, head and body	2·25
„ tail	1·2
„ head	0·85
„ ear (anteriorly)	0·45
„ ear (posteriorly)	0·35
Breadth (posteriorly)	0·4
Length, forearm	2·0
„ thumb	0·28
„ first finger	1·65
„ second finger (metacarp. 1·6, 1st ph. 0·5, 2nd ph. 0·7)	2·8
„ third finger (metacarp. 1·45, 1st ph. 0·4, 2nd ph. 0·35)	2·2
„ fourth finger (metacarp. 1·1, 1st ph. 0·55, 2nd ph. 0·4)	2·0
„ tibia	0·65
„ foot and claws	0·35
„ calcaneum	0·45

Hab. Shiraz, Persia, at an elevation of about 4750 feet.

Type in the collection of the Indian Museum, Calcutta.

With this genus compare *Rhinonycteris*, Gray, founded upon *Rhinonycteris aurantia*, from Port Essington in Australia. It is very remarkable that the most nearly allied genus should be found in a far distant continent, having for the most part a peculiar fauna of its own.

PHYLLORHINA.

Phyllorhina, *Bonaparte, Saggio di una distrib. anim. vertebr.* 1831, p. 16; *Peters, MB. Akad. Berl.* 1871, p. 312; *Dobson, J. A. S. B.* 1872, p. 141.
Hipposideros, *Gray, Proc. Zool. Soc.* 1834, p. 53.
Hipposideros *et* Asellia, *Gray, Mag. Zool. & Bot.* ii. (1838), pp. 492–3.
Macronycteris, Gloionycteris, Rhinophylla, Speorifera, Chrysonycteris, Phyllorhina *et* Asellia, *Gray, P. Z. S.* 1866, pp. 81, 82.

Nose-leaf complicated, consisting of three portions, anterior, posterior, and intermediate; the anterior horseshoe-shaped, as in *Rhinolophus*, though not similarly emarginate in front; the posterior erect, with a convex, lobed or incised free edge, concave in front, the concavity simple or divided by narrow vertical ridges into shallow cells; the intermediate portion (evidently homologous with the sella in *Rhinolophus*), forming the posterior boundary of the depression at the bottom of which the nasal orifices are placed, is usually broadly cordiform with the base upwards, the sides thickened, the centre with or without a projecting point or narrow longitudinal ridge in front.

These are the characters of the nasal appendages in by far the greater number of the species of this genus, which is also distinguished from *Rhinolophus* by the form of the ear-conch, by the absence of the large leaf-like antitragus, and, more particularly, by the presence of two joints only in all the toes, by the number and

character of the teeth, and by the much greater width of the base of the skull between the tympanic bullæ.

Many species are provided with a peculiar frontal sac behind the nose-leaf, which the animal can evert at pleasure like the finger of a glove*; the sides of this sac secrete a waxy substance like that contained in the gular pouches of *Taphozous*; its extremity supports a pencil of straight hairs, of which the ends only project when the sac is inverted.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$†, m. $\frac{3-3}{3-3}$.

First upper premolar minute, blunt, in the outer angle between the canine and second premolar.

Range. Tropical and subtropical regions of Asia, Malayana, Australia, and Africa.

The species of this genus are, unlike *Rhinolophus*, inhabitants of the plains and low hill-ranges of the warmer regions of the continents and islands of the eastern hemisphere lying within the tropical and subtropical zones. The largest Asiatic species, *Phyllorhina armigera*, Hodgs., appears to be the most northerly, having been obtained by Mr. Swinhoe at Amoy, in China, and by the late Captain T. Hutton at Mussooree, in the Himalaya, at an elevation of 5500 feet; *P. bicolor* is also said to have been taken by Capt. Hutton at the same elevation; but these are exceptions among the great number of species of this genus.

Synopsis of the Species.

A. The upper margin of the terminal erect nose-leaf tridentate; no frontal glandular sac..... Subgenus *Asellia*.
  a. Processes of the terminal nose-leaf thickened; extremity of the tail projecting considerably.
    a'. Premolars $\frac{1-1}{2-2}$ (in adults); ears broad [*P. tridens*.]
    b'. Premolars $\frac{2-2}{2-2}$; ears narrow..... [*P. tricuspidata*.]‡
  b. Processes of the terminal nose-leaf not thickened; extremity of the tail projecting slightly.
    c'. Premolars $\frac{2-2}{2-2}$; ears broad ..... 1. *P. stoliczkana*, p. 61.

B. The upper margin of the terminal erect nose-leaf undivided ..... Subgenus *Phyllorhina*.
  a. No frontal glandular sac behind the terminal erect nose-leaf .....
    a'. Terminal nose-leaf as wide or wider than the horseshoe-shaped leaf posteriorly.

* Sir Walter Elliot, Madras Journ. Lit. Sci. x. p. 7 (1839).

† Pm. $\frac{1-1}{2-2}$ in *P. tridens*.

‡ I have included *P. tridens*, Geoffr., from N.E. Africa, and *P. tricuspidata*, Temm., from Amboina and Batjan Islands, to show the position of *P. stoliczkana* in this division of the genus, and also because I think it probable that both these species will hereafter be found within the limits of Asia.

a''. Front surface of the terminal leaf divided into four cells by three vertical ridges.
a. Wings from the ankles; forearm 3″·4 ..... 2. *P. diadema*, p. 61.
β. Wings from the tarsi; forearm 1‴·4 3. *P. pygmæa*, p. 63.
b''. Front surface of the terminal leaf divided into two cells by a single vertical ridge.
γ. Wings from the metatarsus; forearm 2″·6 ..... 4. *P. nicobarensis*, p. 63.
b. A frontal glandular sac (distinct in ♂, rudimentary in ♀) behind the terminal erect nose-leaf.
b'. Terminal erect nose-leaf not so wide as the horseshoe-shaped leaf posteriorly, front surface divided into four cells.
c''. Upper margin of the terminal erect leaf sinuate..... 5. *P. armigera*, p. 64.
d''. Upper margin of the terminal erect leaf convex..... 6. *P. leptophylla*, p. 66.
c'. Terminal erect nose-leaf as wide or wider than the horseshoe-shaped leaf posteriorly.
e''. Front surface of the terminal leaf divided into four cells.
a‴. With secondary longitudinally disposed leaflets external and parallel to the horseshoe.
a. Wings from the ankles; a large transversely opening frontal sac in ♂, rudimentary in ♀.
a'. The last caudal vertebra completely free from the membrane ..... 7. *P. speoris*, p. 67.
β'. The extremity only of the tail projecting ..... 8. *P. larvata*, p. 68.
β. Wings from the metatarsi; frontal sac small in ♂, its position scarcely marked in ♀..... 9. *P. galerita*, p. 69.
b‴. No secondary leaflets external to the horseshoe.
γ. Wings from the ankles or from the tarsi ..... 10. *P. bicolor*, p. 70.
f'. Front surface of the terminal erect nose-leaf not divided by vertical ridges.
δ. Margin of the terminal leaf thick, as in *P. diadema*; ears rounded off above ..... 11. *P. coronata*, p. 72.
ε. Margin of the terminal leaf very thin.
γ'. Outer margin of the ear convex or but slightly flattened in upper third .... 12. *P. doriæ*, p. 73.
δ'. Outer margin of the ear concave in upper third .... 13. *P. obscura*, p. 73.

Fig. *a*.

1. Phyllorhina stoliczkana.

Asellia stoliczkana, *Dobson, P. A. S. B.* May 1871, p. 106; *J. A. S. B.* 1871, p. 263, pl. xx. fig. 1.
Phyllorhina trifida, *Peters, P. Z. S.* June 1871, p. 513; *MB. Akad. Berl.* 1871, p. 315.

Ears nearly as broad as long, with acutely pointed tips; outer margin deeply concave beneath the tip, then very convex, almost meeting the inner margin at the base. Front edge of the horseshoe portion of the nose-leaf raised, bent up in the middle, and separated from the lip by an underlying fold of membrane; on each side of the horseshoe a double fold of membrane; upper transverse nose-leaf large, erect, not thickened as in *P. tricuspidata*; upper portion or crest convex in front, overhanging the concave base, which is divided into four cells by three prominent vertical ridges; the form of the crest is that of an isosceles triangle with an obtuse vertical angle; the apex of this triangle is divided into three points by two narrow perpendicular incisions, extending halfway to the base, the extremities of which are attached to the membrane forming the horseshoe by a vertical band on either side (figs. *a*, *b*).

Fig. *b*.

Wing-membrane attached to the lower part of the ankles; tail of six caudal vertebræ, the last two free.

Fur long and silky, above bicoloured, pure white at the base and for two thirds its length, the remaining portion purplish brown; beneath dirty white throughout.

Length, head and body 1″·6, tail 1″·2, head 0″·6, ear 0″·4 × 0″·35, forearm 1″·5, thumb 0″·2, second finger 2″·6, fourth finger 1″·8, tibia 0″·68, foot and claws 0″·3.

Hab. Pinang.

Type in the Indian Museum, Calcutta; collected and presented by the late Dr. F. Stoliczka.

2. Phyllorhina diadema.

Rhinolophus diadema, *Geoffroy, Ann. Mus. d'Hist. Nat.* xx. p. 263.
Rhinolophus nobilis, *Horsfield, Zool. Research. in Java.*
Rhinolophus griseus, *Meyen, Nova Acta Acad.* xvi. 2, p. 608.
Rhinolophus diadema *et* nobilis, *Temminck, Mon. Mammal.* ii. p. 10.
Hipposideros nobilis, *Cantor, Journ. Asiatic Soc. Beng.* xv. p. 182.
Hipposideros lankadiva, *Kelaart, Prodr. Faun. Zeylan.* p. 19.

The hinder erect nose-leaf equals the horseshoe and slightly exceeds the sella in width, its free margin forming a segment of the circumference of a circle, with a small blunt projection in the centre, and three vertical ridges on its concave front surface; sella large, with a prominent ridge in the centre, forming a small projection above, and one smaller on each side; sides of the muzzle with prominent vertical leaves, three on each side; no frontal pore.

Ears moderate, acutely pointed, concave beneath the tip.

Wings from the ankles; interfemoral membrane large, triangular behind; last caudal vertebra free.

Fur, above, pale shining buff for two thirds the length of the hair, the remaining portion chocolate- or reddish-brown, with ashy extremities; beneath, light greyish or buffy brown throughout.

Length, head and body 3″·4, tail 2″·3, ear 1″ × 0″·8, nose-leaf 0″·45 × 0″·35, forearm 3″·4, second finger 4″·7, fourth finger 3″·7, tibia 1″·45, foot and claws 0″·6.

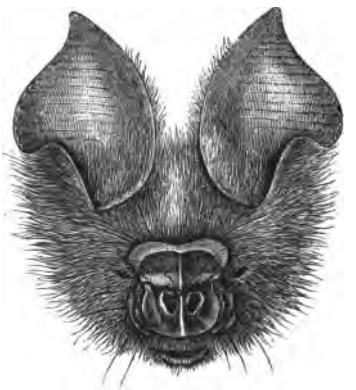
Hab. Peninsula of India generally, from the Himalaya to Southern India; Ceylon, Burma, Sumatra, Java, Borneo, Timor, Batchian Island, Amboyna, Aru Islands, Philippine Islands.

Type in the collection of the Paris Museum.

Subsp. *a*. **Phyllorhina masoni.**

Phyllorhina masoni, *Dobson, J. A. S. B.* 1872, p. 338.

The concave front surface of the terminal nose-leaf is divided into two cells only by a single central vertical ridge (see figure).



P. masoni.

From the under surface of the symphysis of the mandible a small conical bony process projects downwards, about equal to the lower canine tooth in vertical extent, and covered by the integument.

In all other respects this form agrees so closely with *P. diadema* that I must regard the above-described characters as of secondary importance only.

Length, head and body 3″·65, tail 1″·65, ear 1″·1, forearm 3″·35, thumb 0″·6, second finger 5″, fourth finger 3″·9, tibia 1″·35.

Hab. Burma (Moulmein).

Type in the collection of the Indian Museum, Calcutta.

3. Phyllorhina pygmæa.

Rhinolophus pygmæus, *Waterhouse, P. Z. S.* 1843, p. 67.
Phyllorhina pygmæa, *Gray, P. Z. S.* 1866, p. 82; *Peters, Monatsb. Akad. Berl.* 1871, p. 317.

Ears broad, with short subacute tips, the outer margin shortly but conspicuously concave in the upper fourth; nose-leaf large, upper margin of the transverse terminal portion regularly convex, forming an arc of a circle, its front surface with three well-marked vertical ridges; horseshoe projecting by its free margin beyond the upper lip; two vertical leaves on each side; terminal leaf wider than the sella in front; no frontal pore.

Thumb very small. Wings to the tarsus. Interfemoral membrane slightly triangular behind; last caudal vertebra free.

The posterior margin of the cingulum of the canine develops a distinct cusp, and also the anterior margin of the second premolar.

Length, head and body 1″·4, tail 0″·95, ear 0″·5 × 0″·4, nose-leaf 0″·3 × 0″·25, forearm 1″·45, thumb 0″·15, second finger 2″, fourth finger 1″·5, tibia 0″·5, foot and claws 0″·25.

Type in the collection of the British Museum.

Fig. *a*.

4. Phyllorhina nicobarensis.

Phyllorhina nicobarensis, *Dobson, J. A. S. B.* 1871, p. 262, pl. xx. fig. 2.

Ears large, acute, outer margin slightly concave beneath the tip; no froutal sac behind the nose-leaf; upper margin of the transverse terminal leaf simple, forming an arc of a circle, folded back and overhanging the concave front surface, which is divided into *two cells* only by a single central longitudinal ridge; in front the margin of the horseshoe is marked by three small points (figs. *a*, *b*).

Fig. *b*.

Wing-membrane from the base of the metacarpal bone of outer toe; tail of six vertebræ, the last free.

Fur, above light brown at the base, then greyish, with light brown tips; beneath pale brownish.

Length, head and body 3″, head 1″·1, tail 1″·7, ear 0″·9, forearm 2″·6, second finger 3″·7, fourth finger 2″·8, tibia 1″, foot and claws 0″·45.

Hab. Nicobar Islands.

Type in the collection of the Indian Museum, Calcutta; presented by the late Dr. F. Stoliczka.

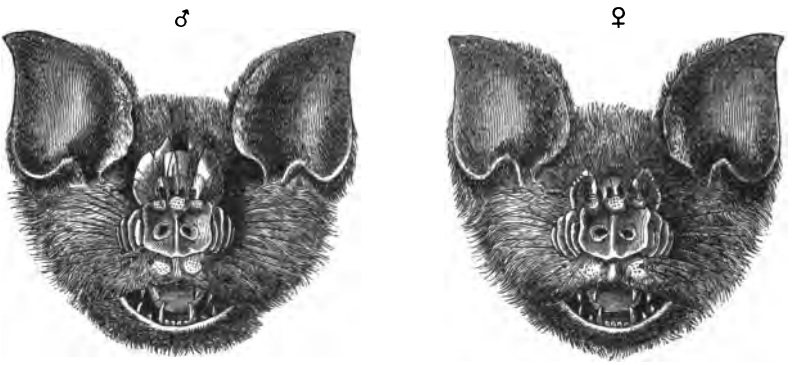


Fig. *a*. Fig. *b*.

5. Phyllorhina armigera.

Rhinolophus armiger, *Hodgson, J. A. S. B.* iv. p. 699.
Hipposideros diadema, *Cantor, J. A. S. B.* xv. p. 181.
Gloionycteris armigera, *Gray, P. Z. S.* 1866, p. 82.
Phyllorhina swinhoei, *Peters, P. Z. S.* 1870, p. 616.
Phyllorhina armigera, *Peters, MB. Akad. Berl.* 1871, p. 317.

The hinder erect nose-leaf narrow, not so broad as the horseshoe, upper edge sinuate, slightly elevated in the centre and at either extremity, vertical ridges beneath well developed, prominent, enclosing moderately deep cells. The wart-like granular elevations on each side above the eyes, so constant in the species of the genus, are, in this species, usually greatly developed, forming large, thickened, longitudinal elevations, extending forwards on each side of the posterior erect nose-leaf, and backwards towards the frontal sac. In an old male, preserved in spirit (fig. *a*, type of the species), the development of these elevations is very great, and they form posteriorly the raised boundaries of a triangular fleshy naked space on the forehead, at the apex of which the large frontal sac is placed. These parts are not so well developed in young males and females (fig. *b*); in the latter they appear as comparatively small longitudinal wart-like bodies, covered with straight hairs; and in them also the frontal sac is small, and placed close behind the posterior erect nose-leaf.

Wing-membrane attached to the tibia a short distance above the ankle-joint; tail long, last vertebra generally half free; interfemoral membrane triangular behind.

Colour of the fur variable; in a large specimen from Darjeeling, dark brown, somewhat paler at the base; in two females from Nipal, on the dorsal surface the fur is tricoloured—at the base, for rather more than one third its length, pale sepia, then a band of grey for the same extent, the remaining portion of the hair dark sepia with paler tips; beneath, at the base and for half their length, of a shade intermediate between that of the upper and lower thirds of the hairs on the upper surface, the remaining portions to the tips of a lighter shade of the same colour.

This is the largest Asiatic species of the genus yet discovered; the fully expanded wings measure nearly two feet across the body from tip to tip.

In the following Table of Dimensions, No. 1 gives the measurements of the adult male (the type of the species) referred to above; No. 2 of an adult female specimen from Katmandu, Nipal; No. 3 of a female specimen from the Khasia hills, Eastern Bengal; and No. 4 of a large dried specimen from Darjeeling.

	1.	2.	3.	4.
	in.	in.	in.	in.
Length, head and body	4·2	3·7	3·5	4·1
„ tail	2·1	2·1	2·2	2·4
„ head	...	1·35	...	...
„ ear (anteriorly)	1·15	1·0	1·1	1·2
Breadth, ear (anteriorly)	0·9	0·8	0·8	1·0
Length, forearm	3·8	3·5	3·3	3·5
„ thumb	...	0·5	...	...
„ second finger	5·0	4·8	4·6	4·8
„ fourth finger	...	3·8	...	3·9
„ tibia	1·6	1·5	1·4	1·5
„ calcaneum	0·7?	0·8?	0·7?	1·0
„ foot and claws	0·7	0·6	0·7	0·7

Hab. Himalaya, Mussoree, Darjeeling, Nipal, Khasia hills; Ceylon; China (Amoy).

Type in the collection of the Indian Museum, Calcutta.

The habits of this species have been attentively observed by the late Capt. J. Hutton; he remarks:—"One specimen was captured at an elevation of 5500 feet, having been attracted one evening in April to the lights in a room; and a pair were also taken in a loft, at 6000 feet, in September. From this loft, the trapdoor being left open, they used to issue every evening about dusk, flying with a slow deliberate flight around the house, and never departing to any great distance. They hawked about only for a short time at intervals, retiring every now and then to the loft.

"When captured alive, the large ears are kept in a constant state of rapid tremulous motion*, and the animal emits a low purring

* This I have observed in many other species of Bats, especially in those with long ears. Compare Osburn, "On the Cheiroptera of Jamaica," P. Z. S. 1865, p. 65.

sound, which becomes a sharp squeak when alarmed or irritated. When suspended at rest, the tail and interfemoral membrane are turned up, not in front, like the *Rhinolophi*, but behind, over the lower part of the back; neither does it appear to envelop itself in its wings so completely as does *R. luctus*.

"I have observed in this, and in all the above-noticed *Rhinolophi*, that when disturbed the whole of the facial crests are kept in a state of constant agitation; and as the animal hangs suspended by the feet, the head and muzzle are stretched forth, and turned about in every direction, as if for the purpose of sniffing out the presence of danger, and ascertaining the cause of the disturbance.

"Coming out of its retreat before dark, and often, indeed, about sunset during the cloudy and misty weather of the rainy season, it may frequently be seen leisurely wheeling with noiseless, cautious, and slow steady flight around some wide-spreading oak, attracted to the spot by the loud discordant note of a large *Cicada*, or tree-cricket, which is abundant at that season in forest-tracts above 5000 feet, and only pours forth its clamorous evening song just as the sun begins to dip below the horizon. . . . .

"It is during this dreadfully harsh concert, when almost every tree sends forth its stunning notes, that this Bat emerges from its hiding-place, wheeling round and round the trees, scanning each branch as he slowly passes by, now rising to a higher circle, and then, perchance, descending to the lower branches, until at length, detecting the unfortunate minstrel, it darts suddenly into the tree, and, snatching the still screaming insect from its perch, bears it away"*.

6. Phyllorhina leptophylla.

Phyllorhina leptophylla, *Dobson, J. A. S. B.* 1874, p. 234.

Ears rather large, broad and triangular, with subacute tips, the outer margin slightly concave beneath the tip. The upper transverse nose-leaf small, upper edge simple, narrower than the horseshoe portion, thin, the three vertical folds in front faintly discernible at the base only; the horseshoe with a small incision in the centre of its front free edge; frontal pore small, placed at some distance behind the transverse nose-leaf.

Wing-membranes from the tibia, a short distance above the ankle; interfemoral membrane triangular, the extremity of the tail projecting.

Fur and integuments dark throughout.

Distinguished from *P. armigera* by its considerably smaller size, by the upper transverse nose-leaf being simple, not lobed above as in that species, and by the incised front edge of the horseshoe, which in *P. armigera* is invariably plain.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5, tail 1″·65, head 1″, ear 0″·9, forearm 2″·45, second finger 3″·55, fourth finger 2″·85, thumb 0″·4, tibia 1″, calcaneum 0″·7, foot and claws 0″·45.

* P. Z. S. 1872, p. 701.

Hab. Khasia hills.

Type presented to the Indian Museum by Major H. H. Godwin-Austen.

Fig. *a*.

Fig. *b*.

7. Phyllorhina speoris.

Vespertilio speoris, *Schneider, Suppl. Schreber, Säugeth. Atlas*, i. pl. 59 B.

Rhinolophus dukhunensis, *Sykes, Cat. Mammal. of Dukhun*, 1831, p. 4.

Hipposideros apiculatus *et* penicillatus, *Gray, Mag. Zool. & Bot.* 1838, ii. p. 492.

Rhinolophus speoris, *Elliot, Madras Journ. Sci.* x. p. 7 (1839).

Hipposideros speoris, *Blyth, Journ. As. Soc. Beng.* 1844, p. 489.

Hipposideros speoris *et* templetonii, *Kelaart, Prod. Faun. Zeylan.* p. 17.

Phyllorhina speoris, var. taitiensis, *Zelebor, Novara Säugeth.* 1868, p. 13.

Phyllorhina speoris, *Peters, MB. Akad. Berl.* 1871, p. 320.

In the form of the ears and nasal membranes and development of the frontal sac (figs. *a*, *b*) this species corresponds very closely with *P. larvata* (p. 68), and may, on superficial examination, be confounded with it, especially when adult females are compared with young females or males. It is readily distinguished, however, by the absence of the incision in the front free edge of the horseshoe, and by the last caudal vertebra being completely free from the interfemoral membrane, also by the much smaller ears.

The following are the measurements of two adult male specimens, No. 1 from Southern India, No. 2 from Prome, Upper Burma*.

	1.	2.
	in.	in.
Length, head and body	2·15	2·4
„ tail	0·8	0·85
„ „ free from membrane	0·12	0·12
„ head	0·85	0·85
„ ear (anteriorly)	0·65	0·7
Breadth „ „	0·48	0·5
Length, forearm	2·0	2·05
„ thumb	0·28	0·28
„ second finger	2·7	2·75
„ fourth finger	2·05	2·25
„ tibia	0·9	0·9
„ calcaneum	0·5	0·5
„ foot and claws	0·35	0·38

Hab. Southern and Central India; Ceylon; Burma, Prome.

* This specimen was found by the writer in a jar containing several spirit specimens of *P. larvata*, Horsf., collected by Dr. Anderson at Prome, Upper Burma.

8. Phyllorhina larvata.

Rhinolophus larvatus, vulgaris, insignis *et* deformis, *Horsfield, Zoolog. Research. in Java* (1824).
Rhinolophus insignis, *Temminck, Monog. Mammal.* ii. p. 74.
Hipposideros insignis, *Gray, Mag. Zool. & Bot.* vol. ii. p. 492.
Hipposideros vulgaris, *Blyth, Journ. As. Soc. Beng.* xiii. p. 488.
Hipposideros larvatus, *Blyth. Cat. Mammal. Mus. As. Soc.* p. 26.
Speorifera vulgaris, *Gray, Proc. Zool. Soc. Lond.* 1866, p. 82.
Phyllorhina larvata, *Peters, MB. Akad. Berl.* 1871, p. 320.

The posterior erect portion of the nose-leaf is as broad as, or slightly broader than the horseshoe, the vertical ridges beneath moderately developed; the intermediate portion simple, without a projecting point or ridge in front; front free edge of the horseshoe with a narrow emargination in the middle line equalling in depth about one third the width of the horizontal nose-leaf; frontal sac greatly developed in adult males, with swollen raised edges and an

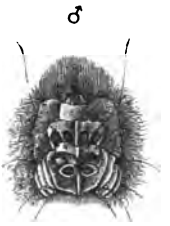


Fig. *a*.

Fig. *b*.

oblique transverse opening, in females rudimentary, its place in dried skins being indicated only by a pencil of dark hairs (figs. *a*, *b*).

Wings from the ankle-joint, or from the tibia a little higher up; interfemoral membrane triangular behind; extreme tip of tail free.

The colour of the fur is extremely variable, according to locality and season; and the species has received almost as many different names as the specimens obtained have presented different colours. A large number of specimens, male and female, brought by Dr. Anderson from Prome, Upper Burma, present all the same hue—golden yellow from the base for three fourths the length of the hair, the remaining portion dark ferruginous brown, corresponding to Horsfield's original description of the colour of this species; of three specimens from the Khasia hills, Assam, two are bluish black, the hairs bluish white towards the base; the third, an adult male, is dark brown with a golden yellow tinge; a specimen from Goalparah, Assam, is light brown, with dark ferruginous brown tips; a not quite adult specimen from Penang is on the upper surface pale buff, almost white for two thirds the length of the hairs, the remaining portion dark brown or sepia.

But not only in colour does this species vary; the adult male specimen from the Khasia hills, referred to above, has the wart-like glandular eminences on each side of the posterior erect nose-leaf greatly developed, resembling closely the same part in *P. armigera*, and so differing remarkably from other specimens, male and female,

obtained in the same locality about the same time, which agree almost precisely with it in measurement and in other respects*.

In the following table of measurements No. 1 refers to an adult male specimen from Prome, Upper Burma; No. 2 to the adult male from the Khasia hills, referred to above; No. 3 to a female specimen from the same locality; and No. 4 to a male specimen from Goalparah, Assam.

	1.	2.	3.	4.
	in.	in.	in.	in.
Length, head and body	2·8	3·0	2·8	2·75
„ tail	1·4	1·5	1·6	1·25
„ head	1·0	1·1	1·0	
„ ear (anteriorly)	...	0·95	0·95	0·7
Breadth „ „	...	0·8	0·8	0·6
Length, forearm	2·35	2·45	2·45	2·25
„ thumb	0·35	0·35	0·35	0·35
„ second finger	3·4	3·4	3·5	3·1
„ fourth finger	2·8	2·6	2·65	
„ tibia	1·0	1·0	1·0	0·9
„ calcaneum	0·6	0·65	0·65	0·5
„ foot and claws	0·5	0·48	0·46	0·45

Hab. Eastern Bengal, Khasia hills, Sylhet, Goalparah, Arracan; Burma, Penang, Prome, Siam, Java.

9. Phyllorhina galerita.

Hipposideros galeritus, *Cantor, J. A. S. B.* 1846, p. 183.
Phyllorhina labuanensis, *Tomes, P. Z. S.* 1858, p. 538.
Phyllorhina longicauda, *Peters, MB. Akad. Berl.* 1861, p. 708; 1871, p. 321.
Phyllorhina brachyota, *Dobson, J. A. S. B.* 1874, p. 237.

Ear comparatively small, as broad as long, inner margin very convex forwards, outer margin slightly concave beneath the tip; nose-leaf as in *P. larvata*; but the transverse terminal leaf is more rectangular, the superior margin less convex, and its concave front surface is marked by three very prominent vertical ridges; frontal pore small, indistinct, not larger than in the females of *P. larvata*.

Metacarpal bone of the thumb longer than the phalanx and claw taken together.

Feet small; wing-membrane from the metatarsus near the base of the toes†. Interfemoral membrane large, triangular behind; extreme tip of the tail free.

Fur, above, light brown at base, the terminal third of the hairs dark reddish brown, the extreme tips paler; beneath similar but somewhat paler. The fur on the shoulders and along the spine darker. Ears and wing- and interfemoral membranes very dark

* The Khasia-hill form of *P. larvata* may be a permanent variety of that species, differing in the presence of the large wart-like prominences on either side of the transverse nose-leaf.

† In the type specimen the wings appear to arise from the ankles; but this may have been caused by shrinking of the membrane in the drying-process. The point of attachment of the wing-membrane to the legs and feet varies so much in this genus that it cannot be depended upon in distinguishing species.

brown. Specimens in colourless alcohol appear very dark brown throughout.

The inner side of the ear-conch along the inner margin is thickly covered with hair; and the back of the ear, except a small portion below the tip and along the upper half of the outer margin, is covered.

The second upper premolar is separated from the canine by a wider interval than usual in this genus; in the midst of this space, but rather to the outside, the small, scarcely distinguishable first premolar is placed.

In the following Table the measurements of the types of *P. galerita*, Cantor, *F. labuanensis*, Tomes, *P. longicauda*, Ptrs., and *P. brachyota*, Dobson, taken by me from the type specimens, are given. Of these, *P. longicauda* evidently represents the fully adult female, and *P. galerita* an adult male with well-developed nasal appendages, the greater development of the nose-leaf in the adult male being a secondary sexual character as in *P. armigera**, Hodgs.

	Length, head and body.	tail.	ear.	Breadth of ear.	Length, forearm.	thumb.	second finger.	fourth finger.	tibia.	foot and claws.
		"	"			"	"	"	"	"
P. galerita, Cantor (type). Pinang	...	...	0·55	0·55	1·8	0·25	2·8	2·1	0·7	0·3
P. labuanensis, Tomes (type). Labuan	...	...	0·55	0·55	1·8	0·25	2·85	2·2	0·72	0·3
P. longicauda, Peters (type). Java	2·0	1·6	0·55	0·55	1·9	0·25	2·8	2·1	0·75	0·3
P. brachyota, Dobson (type). India	1·95	1·4	0·55	0·55	1·75	0·25	2·7	2·1	0·72	0·3

Hab. Peninsula of India (Central India, Deccan), Pinang, Java, Labuan.

10. Phyllorhina bicolor.

Rhinolophus bicolor, *Temm. Monogr. Mammal.* ii. p. 18.
Phyllorhina antricola, *Peters, MB. Akad. Berl.* 1861, p. 709.
Phyllorhina bicolor, *Peters, l. c.* 1871, p. 323.

Ears as long as the head, broad, the lower half of the inner margin very convex; the summit of the ear-conch rounded off broadly as far as a point on the outer side where a slight but distinct flattening occurs and indicates the position of the tip.

Horseshoe small, square, scarcely as wide as the transverse terminal leaf, the concave front surface of which is divided into four cells by three distinct vertical ridges. No secondary leaflets external to the horseshoe. Frontal sac distinct in males, rudimentary in

* *Vide* p. 64, figs. *a*, *b*.

females, with difficulty determined in some, especially in young females.

Wings to the ankles or tarsus; interfemoral membrane slightly angular behind; extremity of tail projecting.

Fur, above, reddish chestnut, the base of the hairs for three fourths their length pale reddish white; beneath similar but paler. Some specimens have the bases of the hairs almost pure white, the extremities dark reddish brown. (For measurements see Table, p. 72.)

Hab. India (N.W. Himalaya), Nicobar Islands, Java, Borneo, Philippine Islands (Luzon).

Subsp. *a*. **Phyllorhina fulva.**

Hipposideros fulvus *et* murinus, *Gray, Mag. Z. & Bot.* ii. p. 492 (1838).
Rhinolophus murinus *et* fulgens, *Elliot, Cat. Mamm. South Mahratta Country*, p. 8 (1840).
Hipposideros fulvus, murinus, atratus, *Kelaart, Prodr. Faun. Zeylan.* pp. 15, 16 (1852).
Phyllorhina aurita, *Tomes, P. Z. S.* 1859, pl. 76.
Chrysonycteris fulva, *Gray, P. Z. S.* 1866, p. 82.
Phyllorhina fulva, *Peters, MB. Akad. Berl.* 1871, p. 322; *Dobson, P. A. S. B.* 1872, p. 155.

Ears large, longer than the head, oval, with broadly rounded tips; lower half of the inner margin very convex; a very slight flattening of the upper fourth of the outer margin. Nasal appendages as in *P. bicolor*.

Wings to the ankles or tarsus; interfemoral membrane slightly angular behind, the end of the tail projecting abruptly.

Fur, above, white for three fourths its length, with brown or dark reddish brown or black extremities; beneath pure white or pale yellowish white, or the white replaced above and beneath by brilliant golden yellow, in which case the extremities of the hairs on the upper surface are rich reddish chestnut. The brilliancy of the fur in some specimens is probably unequalled by that of any other species of mammal. I have expressed my opinion* that this golden-yellow fur is analogous to the breeding-plumage in birds, and that it is restricted to females during the breeding-season. However, during the second Yunan Expedition, Dr. Anderson obtained several males of this species in the same cave, all of which possessed this golden-yellow colour, while males and females obtained at the same time in adjoining caves were of the common black and white kind. These very differently coloured animals differed, however, in no other respect, agreeing in structure in all respects and in measurements (see Table of comparative measurements below). The conditions under which this remarkable difference in colour occurs are therefore still unexplained; but the golden-yellow colour may be developed equally in males and females when the sexes come together, which may not occur at the same season for all.

As *P. fulva* can be distinguished from *P. bicolor* by its larger ears only, I am unable to consider it more than a subspecies.

* P. Z. S. 1873, p. 250.

Hab. India (Kachh, Panjab Salt range, Agra, Chanda, Assam, Khasia and Garo hills, South Mahratta country, Deccan); Ceylon; Burma (Ponsee and Kakyan hills, Isagine, Sagain hills, Prome, Tenasserim Province); China (Amoy).

Subsp. β. Phyllorhina amboinensis.

Phyllorhina amboinensis, *Peters, MB. Akad. Berl.* 1871, p. 323.
Phyllorhina micropus (*Hutton*), *Peters, l. c.* 1872, p. 256; *P. Z. S.* 1872, p. 703.

Very similar to *P. bicolor*; but the ears are shorter, and there is no trace of a frontal sac in the female. The interfemoral membrane is less triangular behind, and the extremity of the tail projects more; nevertheless I cannot consider this form specifically distinct from *P. bicolor*. A large series of specimens of *P. bicolor*, preserved in alcohol, at different periods of growth, is required before it can be satisfactorily determined whether this form represents the not fully adult *P. bicolor* or should be considered even a distinct subspecies.

The measurements at the bottom of the table are taken from an apparently adult female specimen, preserved in alcohol, obtained by my brother, Dr. A. F. Dobson, at Lingasoogoor, in the Deccan, and which was compared by me with the type in the Berlin Museum from Amboyna.

Comparative measurements of P. bicolor *and of subspecies.*

	Length, head and body.	Tail.	Head.	Ear.	Breadth of ear.	Length of fore-arm.	Second finger.	Fourth finger.	Tibia.	Foot and claws.	Sex.	Number.
P. bicolor. Nicobar Islands	1·9	1·2	0·7	0·7	...	1·6	2·45	2·0	0·7	0·32	♀	1
,, ,, ,,	1·8	1·2	0·7	0·7	...	1·55	2·4	1·95	0·7	0·32	♀	2
,, ,, ,,	1·75	1·05	0·65	0·6	...	1·55	2·4	2·0	0·7	0·3	♂	3
P. fulva. Deccan, India	1·9	1·1	0·75	0·85	0·7	1·5	2·35	2·0	0·65	0·32	♂	4
,, ,, ,,	1·9	1·1	0·75	0·85	0·7	1·5	2·3	1·95	0·65	0·32	♂	5
,, Isagine, Cave 2	1·75	1·1	0·75	0·85	0·7	1·55	2·4	2·0	0·7	0·32	♂	6
,, ,, Cave 2	1·65	1·1	0·75	0·9	0·75	1·55	2·3	1·9	0·65	0·32	♂	7
,, ,, Cave 9	1·7	1·15	0·75	0·85	0·7	1·55	2·3	1·85	0·65	0·32	♂	8
,, ,, Cave 9	1·75	1·15	0·75	0·85	0·7	1·65	2·35	1·95	0·65	0·33	♀	9
,, ,, Cave 8	1·75	1·15	0·75	0·85	0·7	1·53	2·35	2·0	0·65	0·33	♂	10
,, Kachh, India	1·75	1·15	0·7	0·8	0·65	1·55	2·4	1·9	0·7	0·32	♀	11
,, Prome, Burma	1·8	1·15	0·7	0·8	0·65	1·55	2·4	1·9	0·68	0·33	♀	12
P. amboinensis. Deccan, India	1·7	0·95	0·65	0·6	0·5	1·4	2·2	1·8	0·65	0·25	♀	13

11. Phyllorhina coronata.

Phyllorhina coronata, *Peters, MB. Akad. Berl.* 1871, p. 327.

Nose-leaf as in *P. diadema*; but the concave front surface of the terminal leaf is not divided into cells by vertical ridges. No secondary leaves on the sides of the muzzle external to the horseshoe; a distinct frontal pore behind the nose-leaf. Ears moderate, rounded above, the upper third of the outer margin slightly flattened as in *P. bicolor*.

Wing-membrane from the tarsus; extreme tip of the tail free.

Above brown, paler at the base of the hairs; beneath yellowish brown.

Length, head and body 2″·7, tail 1″·3, ear 0″·6, forearm 1″·8, thumb 0″·38, second finger 2″·8, fourth finger 2″·4, tibia 0″·7, foot and claws 0″·35.

Hab. Philippine Islands (Mindanao).

Type in the collection of the Berlin Museum.

12. **Phyllorhina doriæ.**

Phyllorhina doriæ, *Peters, MB. Akad. Berl.* 1871, p. 326.

This small species resembles *P. bicolor* very closely in general form and in the shape of the nose-leaf; but the terminal leaf is very thin, and its front surface is unmarked by vertical ridges. The ears are equally convex in the upper third of the outer and inner margins; and there is no trace of the flattening which indicates the position of the tip in *P. bicolor*. A small but distinct frontal sac close behind the terminal nose-leaf. No secondary leaves on the sides of the muzzle.

Wing-membrane from the metatarsus; interfemoral membrane square behind; tail abruptly projecting 0″·15 inch.

Fur reddish brown throughout.

Length, head and body 1″·8, tail 0″·8, head 0″·6, ear 0″·52, nose-leaf 0″·17 × 0″·16, forearm 1″·3, thumb 0″·18, second finger 2″·1, fourth finger 1″·7, tibia 0″·6, foot and claws 0″·26.

Hab. Borneo (Sarawak).

Type in the collection of the Berlin Museum.

13. **Phyllorhina obscura.**

Phyllorhina obscura, *Peters, MB. Akad. Berl.* 1861, p. 709.

Ears slightly longer than broad, concave beneath the tips; a large frontal pore; the terminal nose-leaf without vertical ridges, its concave anterior surface undivided; no secondary leaves on the sides of the muzzle external to the horseshoe.

Wings from the metatarsus; interfemoral membrane straight or slightly concave behind; extremity of the tail projecting abruptly, as in *P. speoris*.

Hair, above, very pale brown (almost white) at the base, then dark brown succeeded by light brown, the tips dark brown; beneath, pale brown.

Length, head and body 2″·2, tail 1″, ear 0″·65 × 0″·6, forearm 1″·8, thumb 0″·28, second finger 2″·6, fourth finger 2″·2, tibia 0″·8, foot and claws 0″·4.

Hab. Philippine Islands (Luzon).

Type in the collection of the Berlin Museum.

CŒLOPS.

Cœlops, *Blyth, J. A. S. B.* xvii. p. 251 (1848); *Peters, Archiv Naturg.* ii. p. 117 (1862); *MB. Akad. Berl.* 1865, p. 644, and 1871, p. 330; *Dobson, J. A. S. B.* 1872, p. 141.

The horizontal nose-leaf, corresponding to the horseshoe in *Rhinolophus* and *Phyllorhina*, is deeply emarginate on the sides and in front, the anterior lappets covering the bases of two long depending leaflets; a sella behind the nostrils somewhat similar to that in *Phyllorhina*, and behind this a transverse concave-fronted erect terminal leaf supporting a heart-shaped projection in the centre. Ears separate. Metacarpal bone of thumb very long, phalanx short; index finger very long, extending beyond the extremity of the first phalanx of the middle finger; toes, as in *Phyllorhina*, of two phalanges each; tail and calcanea short, interfemoral membrane deeply emarginate.

Dentition. Inc. $\frac{1-1}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

The general form of the skull and teeth is very similar to that of *Phyllorhina*. The base of the skull is almost quite similar, and the nasal bones are similarly developed. This genus, therefore, though presenting such remarkable differences in the form of the nasal appendages, stands most nearly related to *Phyllorhina* *.

Cœlops frithii.

Cœlops frithii, *Blyth, J. A. S. B.* xxii. p. 251, xxi. p. 361.

Ears funnel-shaped, as in the genus *Kerivoula* (Vespertilionidæ); the outer side of the ear-conch nearly as deep as the inner, the whole surface of the conch thickly clothed with fine hairs. The nasal appendages as described above; the sides of the horizontal membranes almost concealed by long fine hairs, with which the face is thickly covered; behind the terminal transverse leaf a circular frontal pore, quite similar to that found in some species of *Phyllorhina*. Thumb included in the wing-membrane almost to the base of the claw. Wings to the tarsus close to the ankles; feet very slender, toes with strong claws; calcanea and tail very short; the interfemoral membrane deeply angularly emarginate on a line with the knee-joints.

Fur shining brown above and beneath, the bases of the hairs much paler.

First upper premolar minute, standing in the tooth-row; canine with a prominent talon behind and a smaller one in front, near its summit.

The type, a skin in bad condition, in the Indian Museum, and the only other specimen yet obtained, a well-preserved adult male in alcohol, in the Leyden Museum, have been examined by the writer, and the following measurements obtained:—

Length, head and body 2″, 1″·7; interfemoral membrane in

* Peters, MB. Akad. Berl. 1871, p. 330.

middle 0″·35, 0″·3; ear (anteriorly) 0″·55, 0″·52; forearm 1″·65, 1″·6; index finger 1″·7, 1″·7; second finger—metacarpal 1″·25, 1″·2, first phalanx 0″·3, 0″·3, second phalanx 1″·2, 1″; third finger—metacarpal 1″·25, first phalanx 0″·4, second phalanx 0″·48; fourth finger—metacarpal 1″·35, first phalanx 0″·4, second phalanx 0″·5; tibia 0″·65, 0″·65; foot and claws 0″·35, 0″·35.

The first of each two measurements refers to the type specimen in the Indian Museum, the second to the specimen in the Leyden Museum, from Java.

Hab. Bengal Sandarbans; Java.

Family III. NYCTERIDÆ.

Megadermata, *Peters* (in part), *MB. Akad. Berl.* 1865, p. 256.
Rhinolophidæ, *Gray* (in part), *P. Z. S.* 1865, pp. 81–83.
Nycteridæ, *Dobson, Ann. & Mag. Nat. Hist.* 1875, p. 347.

Bats with distinct cutaneous nasal appendages margining the apertures of the nostrils, which are situated on the upper surface of the muzzle; with large united ears, with well-developed tragi; with two phalanges in the middle finger, of which the first is extended (in repose) in a line with the metacarpal bone; and with or without a short phalanx in the index finger; with long tibiæ, and fibulæ quite rudimentary or absent.

Dentition. Inc. $\frac{0}{4}$ or $\frac{4}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillary bones cartilaginous or small; upper incisors absent, or very small in the centre of the space between the canines; molars well-developed, with acute W-formed cusps.

Hab. Africa; Southern Asia; Malayana.

Subfam. I. MEGADERMINÆ.

Nostrils at the bottom of a concavity on the extremity of the muzzle, concealed by the base of an erect cutaneous process; tail very short, in the base of the large interfemoral membrane; premaxillaries cartilaginous.

MEGADERMA.

Megaderma, *Geoffroy, Annal. du Muséum*, xv. p. 197 (1810); *Peters, MB. Akad. Berl.* 1872, p. 192.
Megaderma *et* Lavia, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838); *P. Z. S.* 1866, p. 83.

Muzzle cylindrical, elongated; nostrils in a slight depression at

the extremity of the upper surface of the muzzle, surrounded by a naked cutaneous expansion, which forms a vertical process posteriorly, and anteriorly is attached to or projects slightly beyond the extremity of the muzzle; lower lip projecting beyond the upper, divided in front by a vertical groove between two naked prominences; ears large, conjoined by part of their inner margins; tragus long, bifid; wings ample, cutaneous system greatly developed throughout; a single very short bony phalanx in the index finger; tibia very long; toes nearly equal in length; outer or first toe with one, the remaining toes with two phalanges each; calcaneum distinct; tail very short (of four or five very small but distinct vertebræ), not discernible except in skeletons; interfemoral membrane large, concave behind; a pair of pubal appendages as in *Rhinolophus*.

Dentition. Inc. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

The first upper premolar small or absent; last molar less than half the antepenultimate molar. Skull much narrowed in front, so that the posterior molars of opposite sides are much further apart

M. lyra.

than the canines; bony palate not extending backwards beyond the last molar; zygomatic arches very wide; frontal bones flattened and slightly expanded laterally; the base of the postorbital process perforated by a small foramen.

This genus includes a few species of Bats of very peculiar aspect, presenting in their general conformation scarcely any affinities with the species of any other genus. The absence of upper incisors, the cylindrical narrow muzzle, the very peculiar nose-leaf and immense connate ears with large bifid tragi, the remarkably large eyes (more like those of the frugivorous Bats), and the apparent absence of the tail, at once distinguish the genus.

The colour of the fur and membranes (a light slaty blue) is also very characteristic and scarcely varies in the different species. The presence near the pubis of a pair of peculiar teat-like appendages connects this genus with the *Rhinolophidæ*.

Distribution of the species—

Africa	2
Asia and Malayana	2

The African species (*M. frons*, Geoffr., and *M. cor*, Peters) differ from the Asiatic (*M. lyra*, Geoffr., and *M. spasma*, L.) in the absence

of the minute first upper premolar, and in the shape of the frontal and nasal bones. Prof. Peters has pointed out* that, although *M. cor* resembles *M. spasma* in the form of the nose-leaf, yet it is closely connected with *M. frons*, not only by the absence of the first upper premolar, but also in the greatly flattened and expanded frontal and nasal bones, terminating laterally in broad postorbital processes as in the genus *Nycteris*. *M. frons* is readily distinguished externally from all the other known species of the genus by the much greater size of the nose-leaf and its free front margin.

Mr. Blyth has shown† that one species at least of the genus (*M. lyra*) occasionally feeds on other than insect prey, as he had taken a specimen in the act of sucking the blood, while flying, from a smaller species of Bat, which it afterwards devoured. The very peculiarly shaped, elongated narrow muzzle, and large trenchant canines with acutely pointed basal cusps, of this and of the other species of *Megaderma*, the projecting mandible and divided lower lip, so different from all insectivorous Bats, naturally lead us to suspect corresponding differences in habits. It is highly probable that none of the species of this genus confine themselves to insect prey alone, but all feed, when they can, upon the smaller species of Bats and other small mammals. I have examined the stomachs and intestines of a great number of specimens of *M. lyra*, but have invariably found them either quite empty or partially filled with pultaceous matter, in which I have not been able to distinguish the remains of insects.

* MB. Akad. Berlin, 1873, p. 488.

† In a paper "On the Sanguivorous and Predaceous Habits of the Bats of the Genus *Megaderma*" (J. A. S. B. vol. xi.), the following very interesting account of the discovery of the sanguivorous habits of *M. lyra* is given by Mr. Blyth:—"Chancing one evening to observe a rather large Bat enter an outhouse, from which there was no other egress than by the doorway, I was fortunate in being able to procure a light, and thus to proceed to the capture of the animal. Upon finding itself pursued, it took three or four turns round the apartment, when down dropped what at the moment I supposed to be its young, and which I deposited in my handkerchief. After a somewhat tedious chase, I then secured the object of my pursuit, which proved to be a fine female of *Megaderma lyra*. I then looked to the other Bat which I had picked up, and, to my considerable surprise, found it to be a small *Vespertilio*, nearly allied to the Pipistrelle of Europe, which is exceedingly abundant, not only here but apparently throughout India. The individual now referred to was feeble from loss of blood, which it was evident the *Megaderma* had been sucking from a large and still bleeding wound under and behind the ear; and the very obviously suctorial form of the mouth of the Vampire was of itself sufficient to hint the strong probability of such being the case. During the very short time that elapsed before I entered the outhouse, it did not appear that the depredator had once alighted; and I am satisfied that it sucked the vital fluid from its victim as it flew, having probably seized it on the wing, and that it was seeking a quiet nook where it might devour the body at leisure. I kept both animals separate till next morning, when, procuring a convenient cage, I first put in the *Megaderma*; and after observing it for some time, I placed the other Bat with it. No sooner was the latter perceived than the other fastened upon it with the ferocity of a tiger, again seizing it behind the ear, and made several efforts to fly off with it; but finding it must needs stay within the precincts of the cage, it soon hung by the hind legs to one side of its prison, and after sucking its victim till no more blood was left, commenced devouring it, and soon left nothing but the head and some portions of the limbs."

Fig. *a*.

Fig. *b*.

Megaderma lyra.

Megaderma lyra, *Geoffroy, Ann. du Muséum*, xv. p. 190 (1810); *Blainville, Ostéographie* (1839); *Blyth, J. A. S. B.* xi. (1842), p. 254, xiii. p. 480 (1844), xx. p. 156 (1851); *Wagner, Suppl. Schreb. Säugeth.* v. 641 (1855); *Dobson, P. A. S. B.* 1872, p. 208; *Peters, MB. Akad. Berl.* 1872, p. 195.

Vespertilio (Megaderma) carnatica, *Elliot, Madras Journ. Sci.* x. p. 5 (1839).

Megaderma spectrum, *Wagner in Hügel's Kashmir*, p. 570 (1844); *Suppl. Schreb. Säugeth.* v. p. 641 (1855).

Megaderma schistacea, *Hodgson, J. A. S. B.* xvi. p. 889 (1847).

Muzzle long and cylindrical, the lower jaw projecting beyond the upper. Ears considerably longer than the head, conjoined for nearly half the length of the inner margin, oval, broadly rounded off above, outer and inner margins slightly convex, the outer margin terminating abruptly midway between the base of the tragus and the angle of the mouth; tragus very large, bifid, the posterior portion long, narrow, and acutely pointed, tapering towards the tip, the anterior part scarcely half the length, broad, with rounded summit continuous with its convex anterior margin. Nose-leaf long, narrow, truncate above, with straight not converging sides; its horizontal base circular, forming a concave disk above the extremity of the muzzle, with the openings of the nostrils at the bottom of the concavity; its anterior surface with a prominent central longitudinal ridge, corresponding to a deep groove on the posterior surface of the leaf, expanded below into a circular disk, the margins of which conceal the nasal apertures. The projecting lip has a triangular naked space in front, divided by a longitudinal groove.

Wing-membrane from the back of the foot, attached close to the base of the outer toe; interfemoral membrane large, square behind; calcaneum short, feeble; the very short tail concealed within the base of the interfemoral membrane.

Fur long and straight, of a peculiar slaty blue colour, paler on the ventral surface.

The membranes are almost naked, but the fur of the body extends upon the humerus and muscular part of the forearm very densely.

First upper premolar very small and internal, partially covered by the expanded cingulum of the large second premolar, which has a very distinct anterior and posterior basal cusp; the upper canine, on each side, has a very distinct acutely pointed internal basal cusp, which appears in recent specimens like an incisor, and also a large but less acute posterior cusp. The four lower incisors are equal in

vertical extent, bifid, and, although close together, not crowded (figs. *a*, *b*).

Dentition. Inc. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Length, head and body 3″·4, ear 1″·7, tragus 0″·7, nose-leaf 0″·55, forearm 2″·7, second finger 4″·7, fourth finger 3″·8, tibia 1″·4, foot 0″·65.

Hab. Peninsula of India (from Kashmir to Cape Comorin); Ceylon.

Megaderma spasma.

Vespertilio spasma, *Linnæus, Syst. Nat.* 1758, p. 32; *Schreb. Säugeth.* i. p. 158 (1775).

Megaderma spasma, *Geoffroy, Ann. du Muséum*, p. 195 (1810); *Cantor, J. A. S. B.* xv. p. 179 (1846); *Blyth, Append. Kelaart's Fauna Zeylanica*, p. 38 (1852).

Megaderma trifolium, *Geoffroy, l. c.* p. 193 (1810); *Wagner, Suppl. Schreb. Säugeth.* v. p. 642 (1855).

Megaderma philippinensis, *Waterhouse, P. Z. S.* 1843, p. 69; *Wagner, l. c.* p. 642.

Muzzle, ear-conch, and tragus very similar to those of *M. lyra*; the posterior portion of the tragus, however, is longer and more attenuated upwards, and more acutely pointed; the nose-leaf is shorter, with convex sides; but the anterior concave disk is considerably larger, and the base of the central thickened process is cordate. Thumbs and wings quite similar to those of *M. lyra*; but the interfemoral membrane is deeper, the calcaneum stronger, and the wing-membrane does not extend so far down upon the foot. Colour and distribution of the fur as in *M. lyra*.

First upper premolar small, but larger than in *M. lyra*; in other respects the dentition is similar in both species.

Length, head and body 3″·4, ear 1″·3, tragus 0″·8, forearm 2″·3, thumb 0″·6, second finger 4″, fourth finger 3″·1, tibia 1″·25, foot and claws 0″·6.

Hab. Malayan region, Tenasserim, Malay peninsula, Sumatra, Java, Borneo, Celebes, Ternate, Philippine Islands, Siam, Ceylon.

Subfam. II. NYCTERINÆ.

Nostrils at the anterior extremity of a deep longitudinal facial groove; tail long, produced to the hinder margin of the interfemoral membrane.

NYCTERIS.

Nycteris, *Geoffroy, Desmarest, Nouv. Dict. d'Hist. Nat.* xv. p. 501 (1803); *Descript. de l'Egypte*, ii. p. 113 (1812); *Peters, MB. Akad. Berl.* 1870, p. 900.

Nycteris *et* Petalia, *Gray, Mag. Zool. & Bot.* ii. p. 494 (1838).

Nycteris *et* Nycterops *et* Pelatia, *Gray, P. Z. S.* 1866, p. 83.

Muzzle cylindrical, as in *Megaderma*, but shorter; and the lower lip has a small wart in front, with two much larger naked promi-

nences below, separated by a vertical groove; the lower lip also scarcely projects beyond the upper; face deeply grooved longitudinally, the depression extending from the nostrils (which are on the upper surface of the muzzle near its extremity) to the low band connecting the bases of the ears; the posterior half of this depression is wider and more deeply grooved than the anterior, and its floor is divided by a very slightly elevated, narrow, longitudinal ridge; the sides of this depression are margined as far back as the eyes by small horizontal cutaneous appendages.

Index finger consisting of the metacarpal bone alone. Wings ample, from the base of the toes. Tail long, the terminal caudal vertebra T-formed. No fibula.

Dentition. Inc. $\frac{4}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors small, bicuspidate or tricuspidate, equal in vertical extent, and close together in the centre of the space between the canines; second lower premolar smaller than the first, often minute and internal to the tooth-row. The frontal bones are greatly flattened and expanded, much more so than in *Megaderma*, and grooved by a deep depression.

Range. One species only has been found in Asia; and this is known from Java alone; the remaining species are African.

I give here a synopsis of the genus to show the position of the single Asiatic species.

Synopsis of the Species.

A. Ears much longer than the head; tragus expanded above, reaching its greatest width opposite the middle of its inner margin.
  a. Inner margin of the tragus convex.
    a'. Second lower premolar minute, quite internal to the tooth-row ..... *N. thebaica.*
    b'. Second lower premolar minute, in the tooth-row .. *N. capensis.*
  b. Inner margin of the tragus straight.
    c'. Second lower premolar minute, half internal ..... *N. macrotis**.

B. Ears slightly longer than the head; tragus expanded, reaching its greatest width opposite the base of its inner margin.
  c. Inner margin of the tragus straight or slightly concave.
    d'. Second lower premolar minute, in the tooth-row; upper incisors trifid ..... *N. hispida.*
    e'. Second lower premolar one third the size of the first, in the tooth-row; upper incisors bifid .... *N. grandis.*
    f'. Second lower premolar two thirds the size of the first, in the tooth-row; upper incisors bifid ..... *N. javanica*, p. 81.

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* NYCTERIS MACROTIS, n. sp.

Length (of an adult ♂ preserved in alcohol), head and body 2″·25, tail 2″·4, head 0″·85, ear 1″·4, tragus 0″·3×0″·18, forearm 1″·9, thumb 0″·5, second finger 3″·6, fourth finger 2″·8, tibia 0″·95, calcaneum 0″·75, foot and claws 0″·4.

Hab. Africa (Sierra Leone).

Type in the collection of the British Museum.

Nycteris javanica.

Nycteris javanicus, *Geoffroy, Ann. du Muséum*, xx. p. 20 (1813).
Petalia javanica, *Gray, Mag. Zool. & Bot.* ii. p. 494 (1838).
Nycteris javanica, *Peters, MB. Akad. Berl.* 1870, p. 906, fig. 9.

Ears longer than the head, oval, broadly rounded off above; inner margin convex in lower third, then straight, and again convex above; outer margin straight in upper third, the remaining part convex, terminating opposite the base of the inner margin in a small rounded lobe; tragus small, directed inwards and forwards, narrowed above, extremity rounded, inner margin slightly concave.

The fur of the body scarcely extends upon the membranes. On the face the posterior cutaneous leaflets margining the longitudinal depression are covered with hair, which also conceals the deep frontal cavity and the low band connecting the bases of the ears; the ear-conch is thinly covered with fine hairs arising from the glandular dots.

The colour of the fur varies, but appears to be generally reddish brown above and a paler shade of the same colour beneath.

Upper incisors bifid; lower incisors slightly crowded, the incisors next the canines slightly in front of the next pair of incisors; the second lower premolar three fourths the size of the first premolar, and standing in the tooth-row.

Length (of an adult ♀ preserved in alcohol), head and body 2″·3, tail 2″·45, head 0″·85, ear 1″·1, tragus 0″·25 × 0″·14, forearm 1″·8, thumb 0″·6, second finger 3″, fourth finger 2″·7, tibia 0″·95, calcaneum 0″·75, foot and claws 0″·45.

Hab. Java.

This species is readily distinguished from all the other species of the genus by the large size of the second lower premolar.

Family IV. VESPERTILIONIDÆ.

Vespertiliones, *Peters**, *MB. Akad. Berlin*, 1865, p. 258.
Vespertilionidæ, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 347†.

Bats with nostrils opening by simple crescentic or circular apertures at the extremity of the muzzle, not surrounded by distinct foliaceous cutaneous appendages‡; with moderately developed, generally separate ears with comparatively large tragi; with two phalanges in the middle finger, of which the first is extended (in repose) in a line with the metacarpal bone; with rather short legs and rudimentary fibulæ. The dental formula never exceeds

$$\text{Inc.}\ \tfrac{2-2}{6},\ \text{c.}\ \tfrac{1-1}{1-1},\ \text{pm.}\ \tfrac{3-3}{3-3},\ \text{m.}\ \tfrac{3-3}{3-3}.$$

The number of incisors varies from $\frac{2-2}{6}$ to $\frac{1-1}{6}$, rarely (in *Antrozous* only) $\frac{1-1}{4}$; premolars $\frac{3-3}{3-3}$ or $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, rarely $\frac{2-2}{3-3}$. The upper incisors are small, separated by a wide space in the centre, and placed in pairs or singly near the canines. Where the upper premolars exceed one in number on each side, the anterior premolars are generally minute or much smaller than those next the molars, and often placed more or less internal to the tooth-line. The molars are well developed, with acute W-formed cusps.

Skull of moderate size; nasal and frontal bones neither extended laterally nor vertically, nor furrowed by depressions as in *Nycteridæ*.

Tail long, in some genera longer than the head and body, contained in and produced to the hinder margin of the large interfemoral membrane.

The *Vespertilionidæ* are easily distinguished by their simple nostrils terminating the conical moderately elongated muzzle, by the long tail wholly contained within the interfemoral membrane, and by the upper incisors, which are separated by a wide space and placed near the canines. Their eyes are minute; and the inner margins of the ears arise from the sides of the head, not from the forehead.

Hab. Generally distributed throughout the temperate and tropical regions of both hemispheres.

* Add the genus *Nyctophilus*.

† *Vespertilionidæ*, Gray (Ann. & Mag. Nat. Hist. 1866, vol. xvii. p. 89), includes genera belonging to very distinct families.

‡ A rudimentary nose-leaf in *Nyctophilus*.

*Synopsis of Genera**.

A. Crown of the head flat or slightly raised above the face-line; upper incisors close to canines.
  a. Ears very large, united.
    a'. Outer margin of the ear-conch terminating opposite the base of the tragus. 1. PLECOTUS, p. 83.
    b'. Outer margin of the ear-conch carried forwards above the mouth and in front of the eye ..... 2. SYNOTUS, p. 85.
  b. Ears moderate, separate.
    c'. Outer margin of the ear-conch carried forwards towards the angle of the mouth.
      a''. Incisors $\frac{2-2}{6}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{1-1}$ ..... 3. VESPERUGO, p. 87.
      b''. Incisors $\frac{1-1}{6}$, pm. $\frac{1-1}{2-2}$ ..... 4. SCOTOPHILUS, p. 119.
    d'. Outer margin of the ear terminating opposite the base of the tragus.
      c''. Nostrils simple, scarcely projecting.
        a'''. Nasal apertures crescentic; first and second upper premolars minute .. 5. VESPERTILIO, p. 126.
        b'''. Nasal apertures circular; first and second upper premolars nearly equal to the third premolar .... 6. KERIVOULA, p. 145.
      d''. Nostrils tubular, projecting considerably beyond the extremity of the muzzle ..... 7. HARPIOCEPHALUS, p. 150.

B. Crown of the head greatly elevated above the face-line; upper incisors separated from the canines and also in front ..... 8. MINIOPTERUS, p. 160.

PLECOTUS.

Plecotus, *Geoffroy, Descript. de l'Egypte*, ii. p. 112 (1812); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306.

Crown of the head elevated above the short and flattened muzzle. Nostrils opening on the upper surface, at the extremity of the muzzle, in front of semilunar naked depressions. Ears united above the forehead, very large; the outer margin ending opposite the base of the tragus, the inner margin with an abrupt rounded projection directed inwards above the base; tragus very large, tapering upwards, with a lobe at the base of the outer margin.

Feet slender, toes more than half the length of the whole foot. Tail equal in length to the head and body, contained, except part of the last caudal vertebra, within the interfemoral membrane. Post-calcaneal lobe distinct.

Skull considerably vaulted; bones forming the brain-case very thin; occipital and sagittal crests scarcely developed.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

* Of genera represented in Asia.

Range. Europe, Northern Africa, Asia (probably not south of the Himalaya).

Plecotus auritus.

Vespertilio auritus, *L. Syst. Nat.* xii. p. 47; *Schreb. Säugeth.* (1775), p. 163, pl. 50; *Geoffroy, Ann. du Mus.* viii. p. 197 (1806); *Desmarest, Mammalogie*, p. 144 (1820).
Vespertilio otus, *Boie, Isis*, 1825, p. 1200.
Vespertilio cornutus, *Faber, Isis*, 1826, p. 515.
Vespertilio brevimanus, *Jenyns, Trans. Linn. Soc.* xvi. p. 55 (1828).
Plecotus auritus, *Geoffroy, Descript. de l'Egypte*, p. 118 (1812); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306; *Blasius, Fauna Deutschl.* p. 39 (woodcut), pp. 37–41(1857); *Kinahan, Proc. Nat.-Hist. Soc. Dublin*, ii. p. 154 (1859).
Plecotus ægyptiacus, *Is. Geoff. Guérin's Mag. Zool.*
Plecotus peronii, *Is. Geoff. l. c.*
Plecotus christii, *Gray, Mag. Zool. & Bot.* ii. p. 495 (1838).
Plecotus bonapartii, *Gray, l. c.*

Head slightly raised above the face-line. Ears very large, nearly as long as the forearm, conjoined by a low band across the forehead at the bases of their inner margins, regularly oval and rounded above, no emargination or concavity in upper third of the outer margin; the outer margin terminates behind the angle of the mouth, from which it is separated by a small wart; the inner margin develops, at a short distance above the base, a rounded prominent lobe directed inwards towards and almost touching its fellow of the opposite side; tragus very long and subacutely pointed, inner margin slightly convex, outer correspondingly concave in upper, convex in lower half, with a rounded lobule slightly above the base, directed downwards and outwards. A large wart above the eye. The nostrils at the anterior extremities of deep well-defined lunate depressions on the muzzle, margined by raised rounded edges.

Wings from the base of the toes; antebrachial membrane wide, anterior margin free throughout; feet slender, calcaneum extending less than half the distance between the foot and end of the tail; no postcalcaneal lobe; the last osseous caudal vertebra generally quite free.

Fur, above and beneath, dark at the base, on the upper surface light shining brown, beneath pale ashy or dirty white. The colour of the extremities of the fur, above and beneath, appears to vary sometimes considerably, according to age and locality; young individuals, and probably females also, are much darker than adult males. Specimens are occasionally found with a reddish tinge on the dorsal surface. Examples from Northern Africa and sandy districts in the neighbourhood of the Mediterranean and Caspian seas are much paler in colour throughout than those from moister countries. This I have frequently observed in specimens of Bats brought from desert regions.

Upper incisors parallel on each side; the inner long and unequally bifid, the smaller cusp external; the outer incisor scarcely half the length of the inner incisor, unicuspidate, not equalling the outer small cusp of the inner incisor in vertical extent, and scarcely one

quarter its size; the second premolar exceeds the canine in transverse section, and is but slightly less than it in vertical extent; last upper molar about equal to half the antepenultimate molar; second lower premolar about two thirds the vertical extent of the first premolar, but scarcely half its transverse diameter; third premolar longer than the second premolar, but less than the first molar.

Length, head and body 1″·8, tail 1″·8, head 0″·65, ear 1″·4 × 0″·65, tragus 0″·6 × 0″·2, forearm 1″·5, second finger 2″·65, fourth finger 2″·1, tibia 0″·7, calcaneum 0″·7, foot and claws 0″·35.

Subsp. α. Plecotus homochrous.

Plecotus homochrous, *Hodgson, Ann. Mag. Nat. Hist.* 1855, xvi. p. 103.

Distinguished from *P. auritus* by the greater length of the ears and comparative shortness of the thumbs. The fur also appears to be of the same or nearly the same colour above and beneath.

The above are the only points I can find to distinguish this form from *P. auritus*; and I do not consider them sufficient to separate it as a distinct species. Hodgson, in describing *P. homochrous*, gives the colour of the fur as the only distinguishing mark; but this character is quite unreliable, as I have already shown.

The following Table exhibits the comparative measurements of *P. auritus* and *P. homochrous*.

	Head and body.	Tail.	Head.	Ear.	Tragus.	Thumb.	Forearm.	Second finger.	Fourth finger.	Tibia.	Foot and claws.
Plecotus auritus.....	1·8	1·8	0·65	1·4	0·6	0·38	1·5	2·65	2·1	0·7	0·35
Plecotus homochrous.	1·7	1·7	0·65	1·55	0·65	0·25	1·45	2·7	2·0	0·6	0·35

Hab. Himalaya (Murri, Simla, Masuri); Khasia hills.

SYNOTUS.

Barbastellus, *Gray* *, *Mag. Zool. & Bot.* 1838, p. 494; *Jerdon, Mammals of India*, p. 47.

Synotus, *Keys. & Blas. Wirbelth. Europ.* p. 55; *Wiegm. Archiv*, 1839, p. 305.

Crown of the head distinctly elevated above the short and obtuse

* Although this genus was defined by Dr. J. E. Gray under the name *Barbastellus* before the term *Synotus* was used by Keyserling and Blasius, yet I agree with Prof. Peters that the latter name should be retained, because the former had been used many years previously to denote a genus very different from *Synotus*. In 1831 the genus *Barbastellus* was defined, having for its type *Barbastellus pacificus*, Gray. In 1838, or perhaps earlier, Dr. Gray discovered that *B. pacificus* was a synonym of *Nyctophilus geoffroyi*, Leach (1822); and in his "Revision of the Genera of Bats," published in the Mag. Zool. & Bot. 1838,

muzzle. Nostrils opening on the upper surface at the extremity of the muzzle, in front of a naked space, bounded laterally by the raised edges of the very prominent sides of the face; anteriorly the upper lip is divided on each side by a deep groove passing down from the nostril; and the intervening space between and below the nostrils is prominent and rounded. Ears conjoined at the bases of their inner margins, which meet on the forehead slightly in front of the eyes, the outer margin is also carried forwards in front of the eyes, terminating on the face above the upper lip, so that the eye is contained within the external ear; tragus triangular above and attenuated towards the tip. Feet slender, with long toes. Tail nearly as long or longer than the body. Skull considerably vaulted behind the short muzzle.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Range. Europe, Northern Africa, Asia (probably not south of the Himalaya).

Synotus dargelinensis.

Plecotus darjelinensis, *Hodgson, Ann. & Mag. Nat. Hist.* 1855, xvi. p. 103.

Barbastellus darjelinensis, *Dobson, P. A. S. B.* 1875, p. 85.

The ears, laid forwards, extend nearly one tenth of an inch beyond the end of the muzzle; in general shape quite similar to those of *S. barbastellus**; but the outer margin has no projecting lobe at the junction of its upper and middle third, and is uninterrupted by any abrupt projection from the tip to its termination above the mouth; the tip is broadly rounded off, not truncated. Tragus, as in *S. barbastellus*, triangular, less attenuated above. Muzzle and nostrils quite similar to the European species; but the prominence between the nostrils in front is covered by short hairs, and the inner side of the ear-conch, along the inner margin, is covered with a band of moderately long hairs, extending more than halfway to the tip.

Length (of an adult ♀ preserved in alcohol), head and body 2″, tail 1″·8, head 0″·65, ear 0″·75, tragus 0″·35, forearm 1″·6, thumb 0″·28, second finger 2″·9, fourth finger 2″·2, tibia 0″·8, foot and claws 0″·3.

Hab. India (Darjiling, Khasia hills, Sikhim, Masuri, Simla); Yarkand.

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he transferred the term *Barbastellus* to another genus, which he then defined, and named as its type *Vespertilio barbastellus*, Schreb. But the name *Barbastellus* having once been applied to denote a certain genus, cannot be transferred from that genus to another (although the genus in question has been previously defined and named), but must remain as a synonym.

* SYNOTUS BARBASTELLUS.

Vespertilio barbastellus, *Schreber, Säugeth.* i. p. 168.

Synotus barbastellus, *Keys. & Blas. Wirbelth. Europ.* p. 55; *Fauna Deutschl.* p. 43, figs. 23, 24 (1857).

The form and position of the lobe on the outer side of the ear is well shown in the figures referred to.

Hab. Europe, from England to Southern Russia.

VESPERUGO.

Vesperugo, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 312; *Fauna Deutschl.* p. 49 (1857).

Muzzle generally very broad and obtuse, the glandular prominences between the eyes and the nostrils well developed, increasing the width of the face; crown of the head flat, or very slightly raised above the face-line; nostrils opening sublaterally by simple crescentic apertures on the front surface of the naked extremity of the muzzle; ears separate, generally much shorter than the head, broad and triangular, the outer margin extending forwards beyond the base of the tragus, the internal basal lobe rounded; tragus generally short and obtuse, the outer margin more or less convex, the inner margin straight or concave. Tail less than the length of the head and body; the calcaneum generally supports on its posterior margin a small rounded cutaneous lobe (*the postcalcaneal lobe*), which, in this genus reaches its greatest development; feet short and broad; membranes thin.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$, or (in subgenus *Scotozous* only) inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Outer upper incisors unicuspidate and shorter than the inner incisors, often minute, rarely absent; first upper premolar minute or absent; first lower premolar in the tooth-row, not crowded, its summit directed slightly outwards.

Range. The temperate and tropical regions of both hemispheres.

Synopsis of Subgenera.

A. Incisors $\frac{2-2}{6}$.
- *a.* Tragus short, not attenuated above, outer margin convex; postcalcaneal lobe distinct.
  - *a'.* Lower premolars 3—3 ..... [*Lasionycteris*]*.
  - *b'.* Lower premolars 2—2.
    - *a''.* Thumbs and soles of feet simple.
      - *a'''.* Upper premolars 2—2 ..... *Vesperugo*, p. 88.
      - *b'''.* Upper premolars 1—1 ..... *Vesperus*, p. 103.
    - *b''.* Thumbs and soles of feet with broad adhesive pads.
      - *c'''.* Upper premolars 2—2 ..... *Glischropus*, p. 114.
      - *d'''.* Upper premolars 1—1 ..... *Tylonycteris*, p. 115.
- *b.* Tragus moderately long, narrow above, outer margin straight, or slightly concave above; no postcalcaneal lobe.
  - *e'''.* Upper premolars 2—2 ..... *Alobus*, p. 116.

B. Incisors $\frac{1-1}{6}$.
- *c'.* Lower premolars 2—2.
  - *f'''.* Upper premolars 2—2 ..... *Scotozous*, p. 118.

* Represented in the American continent only.

Inc. $\frac{2-2}{6}$, *pm.* $\frac{2-2}{2-2}$; *tragus short, not attenuated above, outer margin convex; postcalcaneal lobe well developed; thumbs and soles of the feet simple.* Subgenus VESPERUGO*.

Synopsis of the Species.

A. Wings from the ankles or from the tibiæ higher up.
  a. The tragus reaches its greatest width above the middle of its inner margin.
    a'. Wings from the ankles.
      a''. Lower incisors crowded ..... 1. *V. noctula*, p. 88.
      b''. Lower incisors not crowded..... 2. *V. leisleri*, p. 91.
    b'. Wings from the tibiæ ..... 3. *V. stenopterus*, p. 91.
  b. The tragus reaches its greatest width opposite the base of its inner margin.
    c'. Wings from the tarsus ..... 4. *V. brachypterus*, p. 92.

B. Wings from the base of the toes.
  a. The tragus reaches its greatest width below the middle of its inner margin; tail wholly contained in the interfemoral membrane.
    a'. Second upper premolar separated by a small space from the canine.
      a''. Tragus crescent-shaped, curved inwards.. 5. *V. imbricatus*, p. 93.
      b''. Tragus narrowed above, scarcely curved inwards.
        a'''. Outer upper incisors minute ..... 6. *V. kuhlii*, p. 94.
        b'''. Outer upper incisors as long, or nearly as long, as the outer cusps of the inner incisors.
          α. Outer margin of the ear concave above 7. *V. pipistrellus*, p. 95.
          β. Outer margin of the ear straight.
            a'. Lower incisors crowded..... 8. *V. abramus*, p. 97.
            β'. Lower incisors not crowded..... 9. *V. tenuis*, p. 98.
  b. The tragus reaches its greatest width about the middle of its inner margin; last caudal vertebra free.
    b'. Outer margin of the ear convex in lower half. 10. *V. maurus*, p. 99.
    c'. Outer margin of the ear straight ..... 11. *V. affinis*, p. 102.

1. Vesperugo noctula.

Vespertilio noctula, *Schreber, Säugeth.* i. p. 166, pl. 52 (1775); *Gmel. Linn. Syst. Reg. Anim.* i. p. 146 (1788); *Desmarest, Mammalogie* (1820), p. 136; *Temm. Monogr. Mamm.* ii. p. 169 (1835–41); *Jenyns, Brit. Vertebr.* p. 23; *Bonap. Fauna Ital.* fasc. xxi. (1837); *Bell's Brit. Quadrup.* p. 12, wdct. (1837); *De Sélys-Longch. Faune Belge*, 1842.

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* In my definition of this subgenus in P. Z. S. 1875, p. 471, I restricted it considerably by including only the species in which the wing-membrane extended to the ankles, as *V. noctula* and *V. leisleri*, following thus the definition of Dr. J. E. Gray's genus *Vesperugo*. I have, however, since arrived at the opinion that the position of attachment of the wing-membrane to the foot cannot be considered, in this case at least, even of subgeneric value.

Vespertilio lasiopterus, *Schreb. l. c.* pl. 58; *Geoff. Ann. du Mus.* viii. p. 203 (1806); *Leisler in Mag. Gesellsch. naturf. Freunde zu Berlin*, 1809–10, p. 155.
Vespertilio magnus, *Berkenhout, Synop. Nat. Hist. Gt. Brit. & Irel.* p. ii. (1789).
Vespertilio altivolans, *White, Nat. Hist. Selborne* (1789).
Vespertilio serotinus, *Geoff. Ann. du Mus.* viii. p. 194 (1806).
Vespertilio proterus, *Kuhl, Wetter. Ann.* iv. p. 41 (1817).
Vespertilio labiata, *Hodgson, J. A. S. B.* iv. p. 700 (1835).
Scotophilus noctula, *Gray, Mag. Zool. & Bot.* ii. p. 497 (1838).
Vesperugo noctula, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 317; *Wirbelth. Europ.* p. 46; *Wagner, Suppl. Schreb. Säugeth.* v. p. 728 (1855); *Blasius, Fauna Deutschl.* p. 53, wdct. p. 54 (1857).
Vespertilio macuanus, *Peters, Reise nach Mossambique, Säugeth.* p. 61 (1852).
Noctulinia noctula, *Jerdon, Mamm. of India*, p. 36 (1867).

Head broad and very flat, the labial glandular prominences well developed, adding much to the breadth of the muzzle; posteriorly the raised rounded edge of these prominences forms the anterior margin of a deep furrow, beyond which the long hair covering the head does not pass. Nostrils placed rather widely apart, with a slightly concave intervening space, their inner edges scarcely projecting. Ears nearly as broad as long; the base of the inner margin very convex forwards, the ascending part straight, the tip very broadly rounded off, the outer margin convex and reflected backwards, forming in front of the tragus a thickened convex lobe terminating close to the angle of the mouth. Tragus short and curved inwards above; at the base of the outer margin a small triangular projection succeeded by a concavity; and above this the outer margin becomes very convex, the inner margin correspondingly concave.

Thumb short, with a short blunt claw, at the base of the phalanx a small callosity. Feet thick; toes short, about half the length of the foot. Wing-membranes attached to the ankles. Postcalcaneal lobe large, semicircular, placed on the calcaneum at a distance from the tibia equal to the breadth of the foot. The last rudimentary caudal vertebra free.

Above, the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint; the wing-membrane is covered nearly as far as a line drawn from the middle of the humerus to the knee-joint; the interfemoral membrane is clothed nearly as far back as the middle of the tibia; in front the inner side of the ear is covered with short fine hairs, which also appear upon the tragus, and a few upon the reflected outer margin of the conch; beneath, the wing-membrane is rather thickly clothed as far as a line drawn from the elbow to the knee-joint; and a broad band of fine short hairs passes outwards behind the forearm to the carpus. On the interfemoral membrane the fur extends slightly further than upon the upper surface, but is much shorter.

Inner upper incisor on each side unicuspidate; the outer incisor short, its summit directed inwards towards the inner incisor, its base

nearly double the transverse diameter of the base of the outer incisor; lower incisors crowded, overlapping. First upper premolar very small, in the inner angle between the closely approximated canine and second premolar; last upper molar triangular in cross section, equal to half the antepenultimate molar in diameter from before backwards; the second lower premolar slightly higher than the first, and about half the size of the canine.

Hab. The temperate and tropical regions of Asia, Europe, and Africa; in tropical parts apparently confined to the highlands. In Asia recorded from Japan, China, Malay peninsula, Sumatra, India (Nipal), Caspian district. The distribution of this species is therefore very extended, embracing the greater part of the eastern hemisphere.

Subsp. *a.* **Vesperugo molossus.**

Vespertilio molossus, *Temm. Monogr. Mammal.* ii. p. 269 (1840).
Vesperugo molossus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 738 (1855); *Peters, MB. Akad. Berl.* 1868, p. 639.

In form and colour of the fur almost quite similar to *V. noctula*, but differing remarkably in its much greater size and in the extent of hair upon the wings. Ear and tragus precisely as in *V. noctula*, but very much larger, and the upper half of the surface of the conch and the flattened and reflected external margin thickly covered with erect hairs; the glandular prominences of the muzzle are greatly developed, and are covered with long straight hairs, which also extend along the lips.

The fur of the abdomen extends upon the wing-membrane very densely as far as a line drawn from the knee to the elbow, and thence outwards posterior to the forearm to the proximal fourth of the metacarpal bone of the third finger; along the fifth metacarpal bone the wing-membrane is covered for nearly one inch in breadth; above and beneath the interfemoral membrane is densely covered with hair as far as the end of the third caudal vertebra; above, the wing-membrane is covered as far as a line drawn from the knee to the middle of the humerus.

Teeth as in *V. noctula*, the small first upper premolar often absent.

Hab. Japan; China.

I have placed this form as a subspecies of *V. noctula*, from which it differs in size only and in its much longer hair. I accord this rank very doubtfully, believing that it may represent a large race only of that species, resulting from exceptionally favourable circumstances, as abundance of the most suitable food and a climate permitting of activity in search of food at all seasons.

In the following Table the measurements of two apparently perfectly adult specimens of *V. noctula* and *V. molossus* (which had been well preserved in alcohol) are contrasted; and although the former is very much exceeded in size by the latter, yet in the two the relative measurements of parts exhibit no important differences.

Table showing Comparative Measurements.

	Length, head and body.	tail.	head.	ear.	tragus.	forearm.	thumb.	2nd finger.	4th finger.	tibia.	foot and claws.	Sex.
		"	"	"	"	"	"	"	"	"	"	
V. noctula.....	3·0	2·0	0·9	0·75	0·25	2·0	0·3	3·7	2·1	0·75	0·45	♂
V. molossus ...	3·9	2·45	1·1	0·9	0·3	2·8	0·35	4·7	3·0	0·9	0·6	♂

2. Vesperugo leisleri.

Vespertilio leisleri, *Kuhl, Ann. Wetterau. Gesellsch. Naturk.* 1819, Bd. i. p. 47.

Vesperugo leisleri, *Keys. & Blas. Wirbelth. Europ.* p. 46; *Fauna Deutschl.* p. 56, figs. 35, 36 (1857).

In all respects, except in the relative size and position of the incisors, this species resembles *V. noctula*, and appears on an external examination to be but a small form of that species. But while the outer incisor on each side in *V. noctula* is but half the transverse diameter, at its base, of the inner incisor, in this species it is equal to it; the lower incisors, also, stand in the direction of the jaws, and are not crowded.

Length (of an adult ♂ preserved in alcohol), head and body 2″·3, tail 1″·65, head 0·7″, ear 0″·6, tragus 0″·2 × 0″·15, forearm 1″·5, thumb 0″·25, second finger 2″·7, fourth finger 1″·8, tibia 0″·65, foot and claws 0″·3.

Hab. Europe and the temperate regions of Asia, extending from the Azores to the Himalaya.

3. Vesperugo stenopterus.

Vesperugo stenopterus, *Dobson, P. Z. S.* 1875, p. 470.

Crown of the head very slightly elevated, almost level with the face-line; muzzle broad and flat; labial glandular prominences largely developed, the upper lip symmetrically thickened. Ears short, triangular; the distance between the base of the inner margin and the termination of the outer margin near the angle of the mouth, directly in a line below the eye, is equal to the distance from the base of the inner margin to the summit of the ear; integument forming the conch very thick, especially the lower half of the outer side; tragus short, broad above, narrow opposite the base of the inner margin, with a triangular lobe at the base of the outer margin.

Thumb rather long; feet wholly free from the wing-membrane, which is attached to the tibia a short distance above the ankle; post-

calcaneal lobe small; termination of calcaneum indistinct; tip of tail free.

Fur dark brown throughout; integument and membranes dark brown or black.

The muzzle in front of the eyes, both above and beneath, is almost naked; the ear-conch has some short hairs upon the upper portion. On the dorsal surface the base of the interfemoral alone is covered, and the fur of the body extends upon the interfemoral membrane along the sides of the body only; beneath, the antebrachial membrane has a few hairs; the wing-membrane is covered as far as a line drawn from the elbow to the knee-joint, and a band of short hairs passes outwards to the carpus posterior to the forearm; the legs and feet appear quite naked. Fur very short, dark brown throughout.

Upper incisors similar in form to those of *V. noctula*; inner incisor, on each side, long, with a second cusp placed posteriorly and externally; outer incisor lying close to the inner one, short and unicuspidate, not equalling in vertical extent the short cusp of the inner incisor. The second premolar is separated by a short interval from the canine, through which the small first premolar may be seen from without. In the lower jaw the incisors are crowded; the incisor next the canine, on each side, is conspicuously larger than any of the others; the first and second premolars are equal in vertical extent, but the first is in transverse diameter nearly twice the second.

Length, head and body 2″·35, tail 1″·7, head 0″·75, ear 0″·6 × 0″·4, tragus 0″·23 × 0″·15, forearm 1″·55, thumb 0″·32, second finger 2″·6, fourth finger 1″·65, tibia 0″·55, foot and claws 0″·45.

Hab. Sarawak, Borneo.

Type in the British Museum.

4. Vesperugo brachypterus.

Vespertilio brachypterus, *Temm. Monogr. Mammal.* ii. p. 215, pl. 53. figs. 5, 6; *Wagner, Schreb. Säugeth. Suppl.* v. p. 744.

Head flat; muzzle broad, obtuse; glandular prominences smooth, rounded, naked; ears triangular, rounded off evenly above, the outer margin straight, the distance between the bases of the inner and the outer margins less than the distance between the base of the inner margin and the summit of the ear; the tragus reaches its greatest breadth opposite the base of its inner margin, thence narrower upwards and inwards, obtusely pointed and inclined inwards.

Wing-membrane from the ankle or tarsus; extremity of the tail scarcely projecting.

Fur short, on the upper surface scarcely extending to the membranes; beneath, covering the wing-membrane thinly as far as a line drawn from the elbow to the distal third of the femur. Above dark brown, beneath reddish brown with a yellowish tinge.

Inner upper incisors long, with a second cusp placed posteriorly and externally; outer incisor, on each side, not equal in length to the outer cusp of the inner incisor, and in transverse section not

equal to one third the inner incisor; lower incisors next canines larger than the others; middle incisors slightly overlapped by the outer edges of the central incisors; first lower premolar slightly longer, and in transverse diameter nearly double the second, also nearly equal to the lower canine in vertical extent; second upper premolar separated from the canine by a rather wide space, through which the small internal first premolar is distinctly visible.

Length, head and body 2″·1, tail 1″·2, head 0″·7, ear 0″·55, base of the inner margin to summit of ear-conch 0″·33, tragus 0″·2, forearm 1″·5, thumb 0″·3, tibia 0″·55, foot and claws 0″·4.

The above measurements have been taken from a specimen in the Berlin Museum, which does not appear quite adult; the measurements of the short wings have therefore been omitted.

Hab. Java, Sumatra, Banca.

5. Vesperugo imbricatus.

Vespertilio imbricatus, *Horsfield, Zoological Researches in Java* (1824).

Vespertilio macrotis, *Temminck, Monogr. Mammal.* ii. p. 218.

Ears as long as the head or slightly longer, broadly rounded off above; the basal lobe of the inner margin rounded, the ascending portion slightly convex; the upper third of the outer margin flattened, the middle third slightly convex, faintly emarginate opposite the base of the tragus, and terminating close to the angle of the mouth in a distinct lobe. The tragus is peculiarly shaped and characteristic of this species, in general form regularly crescent-shaped, with a large triangular projection at the base of its outer margin; the inner margin is regularly and rather deeply concave, the outer margin correspondingly convex, meeting the inner margin at an acute point directed inwards, forming the superior cornu of the crescent. The tragus reaches its greatest width slightly below the middle of the inner margin. Glandular prominences between the eyes and nostrils well developed, causing a slight hollow on the muzzle above.

Wings to the base of the toes; postcalcaneal lobe small, indistinct; tip of tail projecting; toes rather more than half the length of the foot, armed with feeble claws.

The distribution of the fur upon the wing- and interfemoral membranes is similar to that in *V. abramus* (p. 97).

Above dark brown; beneath similar, with slightly ashy tips.

Upper inner incisors long, bifid, slanting considerably inwards; outer incisors unicuspidate, acutely pointed, half the length of the inner incisors, but less than half their transverse diameter.

Lower incisors slightly crowded, equal in size, and distinctly trifid. Second upper premolar very close to the canine; first upper premolar very small, its summit scarcely elevated above the gum, crushed in between the canine and second premolar, and not visible from without. First lower premolar acutely pointed, equal to

three fourths of the second premolar; second premolar nearly equal to the canine in vertical extent.

Length (of a ♀ specimen in alcohol), head and body 1″·8, tail 1″·5, head 0″·55, ear 0″·6, tragus 0″·22 × 0″·12, forearm 1″·35, thumb 0″·28, second finger 2″·3, fourth finger 1″·75, tibia 0″·55, foot and claws 0″·25.

Hab. Java.

Fig. *a*.

6. Vesperugo kuhlii.

Vespertilio kuhlii, *Natt. in Kuhl, Deutsch. Flederm. Wetterau. Ann.* iv. p. 58 (1817); *Desmarest, Mammalogie*, p. 140 (1820); *Temm. Monogr. Mammal.* ii. p. 196 (1835–41).
Vespertilio marginatus, *Rüppell, Atlas, Voy. Egypt*, p. 74; *Temm. l. c.* p. 201, pl. 52.
Vespertilio albolimbatus, *Kuster, Isis*, 1835, p. 75.
Romicia calcarata, *Gray, Mag. Zool. & Bot.* ii. p. 495.
Vespertilio vipistrellus, *Bonap. Faun. Ital.* fasc. xx.
Vespertilio lobatus, *Gray, Hardw. Illustr. Ind. Zool.*
Nycticejus canus, *Blyth, Cat. Mammal. Mus. As. Soc. Beng.* p. 32; *Jerdon, Mammals of India*, p. 38.
Scotophilus lobatus, *Jerdon, Mamm. of India*, p. 35 (1867).
Vesperugo leucotis, *Dobson, J. A. S. B.* 1872, p. 212.

Ears shorter than the head, triangular; base of the inner margin very convex forwards, tip of the ear obtusely rounded off, outer margin flatly emarginate above for more than one third its length, causing the tip to project slightly, the lower two thirds slightly convex, the edge reflected backwards, terminating at a short distance behind the angle of the mouth. Tragus larger than in *V. imbricatus*, attaining its greatest breadth slightly below the middle of the inner margin; the triangular lobule above the base of

Fig. *b*.

the outer margin is succeeded by a slight concavity, above which the outer margin reaches its greatest convexity; the inner margin is straight, and the tip is obtusely rounded off from without inwards (figs. *a*, *b*).

Wings from the base of the toes; feet small; calcaneum very long; postcalcaneal lobe distinct, rounded; extreme tip of tail

free. The posterior edge of the interfemoral and wing-membranes generally margined with white; membranes and ears dark.

On the upper surface the fur extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint; posteriorly, about one third of the interfemoral membrane is covered. Beneath, the wing-membrane is thinly covered nearly as far as a line drawn from the elbow to the knee, and half the surface of the interfemoral is clothed with short fine hairs arising from the transverse dotted lines.

Above, black for three fourths the length of the fur, the terminal one fourth light yellowish brown or dun-colour; beneath, black for the same extent, the extremities ashy, becoming almost white on the abdomen and pubes. (This is the colour of the fur in specimens from Southern Europe.)

Inner upper incisors long and acutely pointed; outer incisors very short, scarcely one fourth the length of the inner incisors; the first upper premolar very small, in the angle between the closely approximated second premolar and the canine; lower incisors trifid and slightly crowded.

Length (of an adult ♀ preserved in alcohol), head and body 1″·75, tail 1″·5, ear 0″·55, tragus 0″·25, forearm 1″·35, thumb 0″·25, second finger 2″·4, fourth finger 1″·7, tibia 0″·45, foot and claws 0″·28.

Hab. Southern Asia—India (Calcutta, Deccan, probably distributed throughout), Persia, Palestine: Southern Europe—the countries south of the Alps and the Pyrenees; Northern Africa; Madeira.

Var. *a*. Vesperugo leucotis.

Vesperugo (Pipistrellus) leucotis, *Dobson, J. A. S. B.* 1872, p. 222.

Ears, sides of face about the eyes, interfemoral membrane, antehumeral membrane, and that portion of wing-membrane along the sides of the body white, very translucent; remaining portion of wing-membrane sepia, traversed by very distinct reticulations. Fur, on the upper surface black at the base of hairs for about half their length, remaining portion light yellowish brown; beneath similar, but the extremities of the hairs much paler, almost white.

In this form especially the glandular prominences on the sides of the muzzle are greatly developed in a vertical direction, so as to cause a considerable depression between them on the face.

Hab. Deserts of Northern India and Beluchistan.

7. Vesperugo pipistrellus.

Vespertilio pipistrellus, *Schreb. Säugeth.* i. p. 167, pl. 54 (1775); *Erxleb. Syst. Regne Anim.* p. 148 (1777); *Gmel. Linn. Syst. Natur.* p. 48 (1788); *Geoffroy, Descript. de l'Egypte*, ii. p. 116 (1812); *Kuhl, Wetter. Ann.* iv. p. 53 (1817); *Desmarest, Mammal.* p. 139 (1820); *Jenyns, Trans. Linn. Soc.* xvi. p. 163; *Bell's Brit. Quadr.* p. 31 (1837); *Bonap. Faun. Ital.*; *Temminck, Monogr. Mamm.* ii. p. 194, pl. 48 (1840).

Scotophilus murinus, *Gray, Mag. Zool. & Bot.* ii. p. 497 (1838).
Vespertilio brachyotus, *Temminck, l. c.* p. 172.
Vesperugo pipistrellus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 321; *Wirbelth. Europ.* p. 49 (1840); *Fauna Deutschl.* p. 61 (1857); *Wagner, Suppl. Schreb. Säugeth.* p. 730 (1855).

Muzzle obtuse, glandular prominences well developed, causing a considerable depression between them and the crown of the head, not easily perceived, however, in the living animal, owing to the length of the fur in this situation; the nostrils open almost directly forwards. Ears broadly triangular, rounded at the tips; a deep concavity, occupying rather more than one third of the upper part of the outer margin, commences beneath the broadly rounded summit of the ear; the outer side then becomes abruptly convex, again slightly concave opposite the base of the tragus, and terminates in a convexity which supports about the middle a small rounded lobe directed upwards. The tragus is rounded off towards the inner margin above, the outer margin convex and sloping inwards in its upper third, the inner margin straight; the outer margin has a triangular lobule above the base, not succeeded by an emargination, and then becomes parallel to the inner margin.

Feet small; wings to the base of the toes; postcalcaneal lobe well developed, rounded, placed on the calcaneum at a distance from the end of the tibia equal to half the length of the foot; last (rudimentary) caudal vertebra free.

The head and face, as far as the glandular prominences of the muzzle, are densely covered with hair; in front the muzzle is clothed with short fur, interspersed with a few long straight hairs. The body is densely covered with rather long fur, black at the base and for half the length of the hairs, the remaining half light brown, or, in specimens inhabiting sandy districts, ashy, causing the fur to appear almost white throughout; beneath, about three fourths of the length of the hairs is black, the remaining part to the tips ashy, sometimes with a yellowish or canary-colour tinge.

On the upper surface the fur of the body extends thickly upon the wing-membrane as far as a line joining the middle of the humerus and the knee-joint; on the interfemoral it extends nearly as far as a line drawn between the ankles when the tail and interfemoral membrane are extended; beneath, the wing-membrane is covered as far as a line joining the elbow- and knee-joints; the fur of the body passes upon the interfemoral at the root of the tail only and along the inner sides of the thighs, about half the remaining portion is covered with very fine short hairs, extending principally along the tail.

The upper incisor on each side is long and bifid, the lesser cusp external; the outer incisor as long or slightly longer than the outer cusp of the inner incisor in young individuals; in older specimens the point becomes worn or the inner incisor grows longer, and it is then slightly or considerably shorter. The length of this incisor, however, is variable within a short compass; and I have found it in the same individual shorter than the outer cusp of the inner incisor

on one side of the mouth, and longer than it on the other. Lower incisors very slightly crowded. The second upper premolar is separated by a small space from the canine, and through this interval the summit of the small internal first premolar is visible.

Measurements of an adult female specimen preserved in alcohol —length, head and body 1″·55, tail 1″·45, head 0″·55, ear 0″·5, tragus 0″·22, forearm 1″·2, thumb 0″·22, second finger 2″·1, fourth finger 1″·55, tibia 0″·45, foot and claws 0″·22.

Hab. The temperate regions of Asia north of the Himalaya, and generally distributed throughout Europe and its islands.

8. Vesperugo abramus.

Vespertilio imbricatus, *Temm.* (*non Horsfield*) *Monogr. Mammal.* ii. p. 216, pl. 54; *Wagner, Suppl. Schreb. Säugeth.* v. p. 738 (1855).
Vespertilio abramus, *Temm. l. c.* p. 232, pl. 58; *Wagner, l. c.* p. 739.
Scotophilus javanicus, *Gray, Mag. Zool. & Bot.* ii. p. 498 (1838).
Scotophilus coromandra, *Gray, l. c.*
Vespertilio coromandelicus, *Blyth, J. A. S. B.* p. 159 (1855).
Vesperugo blythii, *Wagner, op. cit.* p. 742 (1855).
Scotophilus coromandelicus, *Horsfield, A. & M. N. H.* 1855, p. 5.
Vespertilio coromandelicus, *Tomes, P. Z. S.* 1858, p. 539.
Pipistrellus coromandelicus, *Dobson, J. A. S. B.* 1871, p. 461.
Vesperugo imbricatus (*Hutton*), *Peters, P. Z. S.* 1872, p. 707.

Muzzle obtuse, more so than in *V. pipistrellus*, glandular prominences on the sides large, rounded, adding more to the width than to the depth of the muzzle, and causing a furrow between them and the crown of the head. Ears triangular, as in *V. pipistrellus*; but the outer margin is straight or very slightly concave, and the tragus is somewhat shorter, and its inner margin rather more concave.

Feet small; wing-membrane attached to the base of the toes; postcalcaneal lobe distinct, rounded; last rudimentary caudal vertebra free.

The head, and face between the eyes, are densely covered with moderately long fur, while the space in front of the ears, about the eyes, and the extremity of the muzzle generally are almost naked. Laterally, the fur of the body covers only the proximal third of the humerus and half the femur, and its extent upon the wing-membrane is limited to a narrow portion along the sides of the body; beneath, the humerus and femur are similarly covered, but a wider portion of wing-membrane is occupied, the fur extending as far as a line drawn from the elbow to the knee-joint. The upper surface of the interfemoral is covered as far as the end of the third caudal vertebra; beneath, the fur of the abdomen covers the root of the tail only, the remaining portion is clothed with very short thinly spread hair.

Above, dark brown, the hair tipped with light yellowish brown, on the head, face, and neck wholly yellowish brown; beneath, soot-brown, the extremities of the hairs much paler than upon the upper surface.

Upper inner incisors long and bifid, the external cusp placed slightly posteriorly; the outer incisor on each side slightly exceeding the outer cusp of the inner incisor in length. Lower incisors not crowded. The second upper premolar separated by a slight interval from the canine, through which the summit of the small first premolar may be seen.

Length (of an adult ♂ preserved in alcohol), head and body 1″·75, tail 1″·4, head 0″·6, ear 0″·5, tragus 0″·22, forearm 1″·25, thumb 0″·25, second finger 2″·35, fourth finger 1″·7, tibia 0″·5, foot and claws 0″·28.

Hab. Peninsula of India; Ceylon; Burma; Southern China, Japan, and the islands of the Malay archipelago, probably extending into Australia.

This is probably the most common Bat in Southern Asia. In Europe, and probably throughout Northern Asia also, its place is taken by the Pipistrelle (*V. pipistrellus*), which it resembles closely, but is easily distinguished by the absence of the deep emargination on the outer side of the ear, so well marked in the Pipistrelle, also by the relative length of the upper incisors, and by other characters mentioned in the descriptions of both species.

9. Vesperugo tenuis.

Vespertilio tenuis, *Temm. Monogr. Mamm.* ii. p. 229, pl. 57. figs. 5–7 (1835–41).

Vesperugo tenuis, *Wagner, Suppl. Schreb. Säugeth.* ii. p. 740 (1855).

Ears smaller than those of *V. abramus*; tragus rather broad and short, attaining its greatest breadth slightly below the middle of the inner margin; muzzle broad and conical, nearly naked.

Feet rather large; wings to the base of the toes; postcalcaneal lobe distinct, not deep; extreme tip of the tail projecting.

Upper inner incisors sloping considerably inwards and forwards, bifid at the extremity, the outer incisor on each side slender and shorter than the outer cusp of the inner incisor; lower incisors not crowded, in the direction of the jaw; second upper premolar separated by a small interval from the canine; the first small internal premolar almost concealed by the canine.

Length, head and body 1″·65, tail 1″, head 0″·55, ear 0″·42, tragus 0″·18, forearm 1″·15, thumb 0″·28, second finger 2″, fourth finger 1″·5, tibia 0″·5, foot and claws 0″·25.

Hab. Sumatra, Java, Borneo.

Subsp. *a.* Vesperugo irretitus.

Vespertilio irretitus, *Cantor, Ann. & Mag. Nat. Hist.* ix. p. 481 (1842).

Vespertilio meyeni, *Waterhouse, P. Z. S.* 1845; *A. & M. N. H.* xvi. p. 53.

The ears are very similar in shape and size to those of *V. abramus*, with which this species might be confounded. The outer margin of the ear is straight, as in that species, or even slightly convex throughout; the tragus is more narrowed above, slightly smaller, and the

lobule near the base of the outer margin less distinct. The head is also distinctly broader, and more raised above the face-line; and this breadth of the head causes the muzzle to appear triangular; the glandular prominences are well developed, but occupy chiefly the sides of the muzzle and the upper lip, which is considerably thickened, and do not cause a depression on the upper surface of the evenly rounded muzzle. The terminal phalanx of the thumb is conspicuously larger than in *V. abramus*; and so are the feet; the post-calcaneal lobe is narrow and long, and commences close to the ankle; the tip of the tail projects. On the upper surface the fur is almost limited to the body, and the face in front of the ears is nearly naked. Beneath, the fur extends thickly outwards upon the wing-membrane about as far as a line drawn from the middle of the humerus to the knee-joint; almost the whole surface of the interfemoral membrane is thinly clothed with short, fine, white hairs.

The inner upper incisors are moderately long and bifid, the second cusp placed posteriorly and internally; the outer incisors in cross section equal to and nearly as long as the inner incisors, and exceeding considerably in vertical extent the second cusp of the inner incisors. Lower incisors not crowded. The first upper premolar is longer than in *V. abramus*, and is placed quite internal to the canine, so that, although the second premolar is separated by a small interval from the canine, it can scarcely be seen from without. The first lower premolar is equal to quite three fourths of the second premolar.

Length, head and body 1″·55, tail 1″·2, head 0″·55, ear 0″·48, tragus 0″·22, thumb 0″·3, second finger 2″, fourth finger 1″·5, forearm 1″·3, tibia 0″·45, foot and claws 0″·28.

Hab. Chusan, east coast of China.

Type in the collection of the British Museum.

V. irretitus resembles the preceding species very closely, and, when additional and more adult specimens are available for examination, may be proved to be identical. The chief difference consists in the form and relative proportions of the upper incisors and of the premolars, characters not always trustworthy.

Fig. *a*.

10. Vesperugo maurus.

Vesperugo maurus, *Blasius, Wiegm. Arch.* 1853, p. 35; *Fauna Deutschl.* p. 67, figs. 43, 44 (1857).
Vesperugo mordax, *Peters, MB. Akad. Berl.* 1866, p. 402.
Vesperugo pulveratus, *Peters, P. Z. S.* 1870, p. 617.
Pipistrellus austenianus, *Dobson, P. A. S. B.* 1871, p. 213.

Muzzle broad and flat above, the glandular prominences on each

side well developed, increasing the width of the muzzle; nasal orifices opening almost on a level with the front surface of the muzzle, without intervening emargination. Ears broad, triangular, broadly rounded off above; the outer margin straight above for nearly half its length, then slightly convex to the base, terminating midway between the base of the tragus and the angle of the mouth in a small lobe; tragus broad, reaching its greatest breadth about the middle

Fig. *b*.

of the inner margin, at the base of the outer margin a distinct triangular lobule, succeeded above, immediately below the middle of the outer margin, by a second but very small projection, indistinct in some specimens; inner margin straight, outer margin parallel to the inner margin, convex above.

Toes about half the length of the whole foot; last caudal vertebra free, or the last and half the antepenultimate vertebra free, especially in the smaller specimens of this species from higher latitudes.

The fur of the body is rather long and dense. In front it extends forwards upon the face as far as a line drawn between the eyes; behind, it projects over the base of the interfemoral membrane, but does not extend upon it; laterally it covers a very narrow portion of the wing-membrane, above and beneath, along the sides of the body. The interfemoral membrane is naked above, with the exception of a few fine and almost invisible hairs placed along the first and second vertebræ; beneath, it is covered for more than two thirds its extent with short greyish hairs, thickest at the root of the tail.

Uniformly sooty brown or deep black throughout, with greyish or ashy tips, which give to the fur on the ventral surface a slightly greyish appearance. Cutaneous system black; the nose, ears, and naked glandular prominences of the upper lip are intensely black.

Upper incisors nearly equal in length; the inner incisor on each side bifid, its outer and shorter cusp directed slightly backwards, and in a plane posterior to the outer incisor, which equals or somewhat exceeds it in vertical extent; lower incisors crowded, overlapping; first upper premolar small, quite internal to the tooth-row, in the small northern forms not visible, but in the larger animals from Southern Asia visible from without; second premolar close to the canine.

The following Table shows the relative measurements of specimens of this species from very distant localities:—

	Length, head and body.	tail.	free from membrane.	ear.	tragus.	thumb.	second finger.	fourth finger.	forearm.	tibia.	foot and claws.
	"	"	"	"	"	"	"	"	"	"	"
India (Khasia hills)	1·9	1·6	0·08	0·7	0·25	0·25	2·75	1·8	1·5	0·55	0·3
Java	2·0	1·6	0·10	0·65	0·25	0·28	2·65	1·8	1·6	0·55	0·3
China (Pekin).....	1·85	1·25	0·15	0·55	0·23	0·25	2·2	1·5	1·35	0·5	0·28
Switzerland	1·9	1·3	0·12	0·62	0·23	0·25	2·2	1·6	1·35	0·55	0·3

Hab. India (Khasia hills); Java; China (Pekin, Amoy, Cochin China); Europe (Switzerland, Tyrol); Canary Isles (Palma, Teneriffe).

This species probably extends throughout that long axis of elevation which, commencing on the European side in the Pyrenees, traverses the whole of Southern Europe and Central and Southern Asia, sending down at right angles secondary axes, with which the Western Ghats in India and the elevated land extending downwards through the Malay peninsula to Sumatra and Java are almost directly continuous.

I at first considered the Indian and Javan forms distinct from the European species, differing in the greater development of the first upper premolar (which in them is visible from without), in the much shorter free extremity of the tail, and in their conspicuously greater size; but direct comparison of well-preserved specimens has convinced me that they represent the same species, especially as I have found many specimens of other species of Bats differ in the same respects though evidently belonging to the same species. Thus the Himalayan *Plecotus auritus* has the tail almost wholly included and the thumb shorter, while in the European form the extremity of the tail very constantly projects 0″·15 beyond the interfemoral membrane. Yet intermediate forms are found showing that these differences are not sufficient to separate the Indian from the European animal. This species is very readily distinguished by its broad tragus, and by the intensely black colour of the integuments and of the greater part of the fur, the extreme tips of the hairs being slightly grizzled, especially on the posterior half of the back and on the abdomen.

Fig. *a*.

11. Vesperugo affinis.

Pipistrellus affinis, *Dobson, P. A. S. B.* 1871, p. 213.

Head flat; glands of the upper lip so developed as to cause a deep depression between them on the face behind the nostrils. Measured from behind, the ears are as broad as long; their inner margins are convex, and the tips broadly rounded; the outer margin of the ear extends from the tip to its termination near the angle of the mouth without emargination, and without forming a lobe of any kind; from the angle of the mouth it is separated by a small wart covered with long hairs. The tragus is of the shape so common in the species of

Fig. *b*.

this subgenus; its inner margin is straight, its outer convex upwards; and at its base the usual small triangular lobe is placed. The nostrils open sublaterally; and in the centre of the slightly emarginate space between them a narrow ridge passes down to the upper lip, as in the greater number of species of the section of the genus to which this belongs.

The wing-membrane is attached to the base of the outer toe, which is shorter than the others. The tail is long, of nine vertebræ, the last free. The feet are small, the toes very slender and almost naked.

Above, the fur of the head extends upon the face, above the eyes, as far as the glandular prominences of the upper lip; the remaining parts of the face are almost naked; anteriorly the ear-conch has a few fine scattered hairs; posteriorly about half the posterior surface from the base upwards is densely covered. The distribution of the fur upon the wing-membranes is very limited on the upper surface, being confined to a narrow space along the sides of the body; beneath, its extent is greater, and a few fine greyish hairs are ranged along parallel lines nearly as far outwards as a line joining the elbow- and knee-joints. The fur of the body does not extend upon the interfemoral membrane, which has but a few almost invisible hairs scattered over the anterior half of its upper surface, and is covered

beneath by very fine short greyish hairs, arising from the dots on the transverse dotted lines.

On the upper surface chocolate-brown, lighter on the head and neck; beneath, dark brown, with light-brown or ashy tips; on the pubes and along the thighs dirty white or very pale buff.

Incisors nearly equal in vertical extent; outer incisors acutely pointed; first upper premolar minute, acutely pointed, placed inside the line of teeth and not distinguishable from without.

The single specimen, an adult female preserved in spirit, from which the above description is taken was obtained by Dr. Anderson at an elevation of about 4500 feet, at Bhamo, Yunan.

Length, head and body 1″·9, tail 1″·65, head 0″·75, ear 0″·6, tragus 0″·25, forearm 1″·55, thumb 0″·25, second finger 2″·8, fourth finger 2″, tibia 0″·6, foot and claws 0″·3.

Hab. Bhamo, Yunan.

This species is closely allied to *V. maurus*, which it resembles in dentition and in the free last caudal vertebra; but it is readily distinguished by the straight outer margin of the ear-conch, by the colour and distribution of the fur, and by the large number of caudal vertebræ.

Incisors $\frac{2-2}{6}$, *pm.* $\frac{1-1}{2-2}$; *tragus as in* Vesperugo, *but generally somewhat longer; postcalcaneal lobe narrow; wings from the base of the toes; thumbs and soles of the feet simple.* Subgenus VESPERUS.

Synopsis of the Species.

A. Upper outer incisors placed in a line with the inner incisors or slightly anterior to them.
  a. The tragus reaches its greatest width about the middle of its inner margin, curved inwards; inner margin concave ..... 1. *V. pachyotis*, p. 104.
  b. The tragus reaches its greatest width about the middle of its outer margin, not curved inwards; inner margin straight.
    a'. Outer incisor on each side as long or nearly as long as the outer cusp of the inner incisor.
      a''. Lower incisors placed at right angles to the direction of the jaws ..... 2. *V. borealis*, p. 105.
      b''. Lower incisors placed in the direction of the jaws ..... 3. *V. discolor*, p. 106.
    b'. Outer incisor much shorter than the outer cusp of the inner incisor, scarcely raised above the gum ..... 4. *V. atratus*, p. 107.
  c. The tragus reaches its greatest width below middle of the inner margin.
    c'. Tragus straight; extremity of the tail projecting.
      c''. Last two caudal vertebræ free; ears broader ..... 5. *V. serotinus*, p. 108.
      d''. Last caudal vertebra free; ears narrower ..... 6. *V. andersoni*, p. 110.

d'. Tragus curved inwards; tail wholly contained in the interfemoral membrane. 7. *V. doriæ*, p. 112.

B. Upper outer incisors placed behind the inner incisors ..... 8. *V. tickelli*, p. 113.

Fig. *a*.

1. Vesperugo pachyotis.

Vesperugo (Vesperus) pachyotis, *Dobson, P. A. S. B.* 1871, p. 211.

Head flat; muzzle very broad and short, glandular prominences much developed; immediately behind them a furrow extends from the anterior corner of one eye to that of the other, beyond which the fur of the head does not pass. Ears triangular above, with rounded tips; outer side straight, without emargination; lower portion of

Fig. *b*.

the ear (from below the level of the tip of the tragus to the termination of the outer margin near the angle of the mouth) very thick and fleshy; tragus short, curved inwards (figs. *a*, *b*).

Wing-membrane from the base of the toes. Fur, above, dark brown throughout; beneath, a lighter shade of brown.

Teeth very small; inner incisors bifid at their extremities, much larger and longer than the outer ones.

Fig. *c*.

Length (of an adult ♂ preserved in alcohol), head and body 2″·2, tail 1″·6, head 0″·7, ear 0″·55 × 0″·4, tragus 0″·18 × 0″·1, forearm 1″·6, second finger 2″·7, fourth finger 1″·7, thumb 0″·25, tibia 0″·65, foot and claws 0″·35.

This species is readily distinguished by the peculiar thickness of the lower half of the outer side of the ear-conch, which appears, as it were, excavated out of the thick integument of the neck. The

tragus is short, rounded off broadly above and curved inwards as in *V. noctula*; but the minute upper premolar, so constant in *V. noctula*, is absent, and the wing-membrane extends quite to the base of the toes.

In the form of the ears and muzzle especially, and generally in the whole conformation, this species appears to belong to the subgenus *Vesperugo*; but the absence of the first minute upper premolar relegates it to *Vesperus*. Nothing could illustrate better the artificial character of these subgenera, which, however, are convenient in determining the species.

2. Vesperugo borealis.

Vespertilio kuhlii, *Nilsson, Illum. Fig. Skandin. Fauna*, häft 17. pl. 34 (1836).
Vespertilio borealis, *Nilsson, Illum. Fig. Skand. Fauna*, häft 19. pl. 36 (1838); *Lilljeborg, Sver. Norges Ryggradsdjur*, i. p. 129 (1874).
Vesperugo nilssoni, *Keys. & Blas. Wiegm. Archiv* (1839) p. 315; *Wagner, Suppl. Schreb. Säugeth.* i. p. 498, v. p. 733; *Blasius, Fauna Deutschl.* p. 70 (1857).

Ears triangular, with broadly rounded tips; the outer margin straight, terminating close to and on a level with the angle of the mouth; the inner margin with a rounded basal lobe, the ascending part very convex in lower third, then sloping upwards and backwards. Tragus expanded above and slightly curved inwards; the outer margin has an acute triangular lobe at the base; above this it increases in convexity, and the tragus reaches its greatest width about the middle of its outer margin; the inner margin is straight below and slightly concave above.

Wings to the base of the toes; thumbs and feet rather short; a distinct but shallow postcalcaneal lobe; the last two caudal vertebræ free.

Fur, above, very dark brown, with yellowish brown extremities; beneath, similar, with ashy tips.

On the upper surface the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee; beneath, similar; the base of the interfemoral, above and beneath, is alone clothed.

Inner upper incisors bifid; outer incisors as long as the outer cusp of the inner incisors, and equal to the latter in cross section at the base; lower incisors crowded, placed at right angles to the direction of the jaws, trifid, the incisors next the canines rounded above and higher than the rest; first lower premolar small, not half the size of the second premolar, which equals or nearly equals the canine in vertical extent.

The outer upper incisors, generally minute in the subgenus *Vesperus*, appear to reach their greatest development in this species.

Length, head and body 2″, tail 1″·7, head 0″·65, ear 0″·55, tragus 0″·2, forearm 1″·5, second finger 2″·5, fourth finger 2″, tibia 0″·7, foot and claws 0″·35.

Hab. Northern Asia and Europe. In Asia inhabiting the Altai

Mountains, extending thence to the Ural ranges; in Europe extending through Russia to the Scandinavian peninsula, as far north (according to Nilsson) as the polar circle. Its southern limit appears to be those parts of Northern China separated by the Altai Mountains from Siberia, and in Europe the Harz Mountains. It has not yet been recorded from the British Isles.

Vesperugo borealis has thus the most northern range of any species of Bat as yet known.

3. Vesperugo discolor.

Vespertilio discolor, *Natterer, Kuhl, Deutsch. Flederm. Wetter. Ann.* iv. (1819); *Desm. Mamm.* p. 139 (1820); *Bell, Brit. Quadrup.* p. 21, woodcut; *Temm. Monogr. Mammal.* ii. p. 173 (1841).
Vespertilio serotina, *Pallas, Zoogr. Rosso-Asiat.* p. 123.
Scotophilus discolor, *Gray, Mag. Zool. & Bot.* ii. p. 297.
Vesperugo (Vesperus) discolor, *Keys. & Blas. Wirbelth. Europ.* p. 50; *Faun. Deutschl.* p. 73, woodcut (1857).
Vesperus discolor, *Wagner, Suppl. Schreb. Säugeth.* v. p. 733 (1855).

Head broad and flat; muzzle triangular, the glandular prominences moderately developed, not causing a depression on the face above; end of nose and upper lip slightly projecting beyond the lower lip; inner basal lobe of ear-conch rounded, not very convex forwards; inner margin of ear regularly convex to the tip; rather more than the upper third of the outer margin is straight or slightly concave, a narrow portion of the edge about the middle is folded backwards, then emarginate opposite the base of the tragus, and terminating in a long and deep but not prominent lobe behind the angle of the mouth, from which it is separated by a wart; tragus narrow opposite the base of the inner margin, expanded above, the outer margin attaining its greatest convexity slightly above the middle of the inner margin, which is straight or slightly convex above, at the base of the outer margin a triangular lobule.

Wings from the base of the toes, which are three fourths the length of the whole foot. Calcaneum margined posteriorly by a narrow lobe. The last caudal vertebra and part of the antepenultimate vertebra free.

On the upper surface the fur of the body extends upon the wing-membrane almost as far as a line drawn from the middle of the humerus to the knee-joint, on the interfemoral membrane as far as the end of the fourth caudal vertebra. Beneath, the wing-membrane is similarly covered; but almost the whole interfemoral membrane is covered with fine hairs, which abound principally along the tail.

Fur, above, dark brown, with whitish tips; beneath, dark brown, the terminal one fourth of the hairs dirty white.

Upper inner incisors long, bifid, the outer cusp shorter than the inner, and placed slightly posterior; the outer incisors unicuspidate and short, not equalling the outer cusp of the inner incisor in vertical extent. Lower incisors slightly crowded, but not overlapping. First lower premolar about half the height of the second.

Length (of an adult ♀ from Kizil, Himalaya), head and body 1″·95, tail 1″·7, ear 0″·6, tragus 0″·25, forearm 1″·6, thumb 0″·28, second finger 2″·5, fourth finger 2″, tibia 0″·7, foot and claws 0″·33.

Hab. Himalaya (Kizil); Central Europe (Russia to England).

Specimens of this species were obtained by the late Dr. Ferdinand Stoliczka during the expedition to Yarkand in 1873. Of two specimens obtained at different localities (both well preserved in alcohol) one is very much smaller than the other; yet the extremities of the finger-bones in the smaller specimen appear quite consolidated, as in adult animals. A similar instance appears to occur in a specimen of the Serotine from Arabia, preserved in the Paris Museum (*Vesperus bottæ*, Peters), which is much smaller than specimens of the same species from Persia and Europe, yet in which the extremities of the finger-bones *appear* quite consolidated also.

Fig. *a*.

4. Vesperugo atratus.

Nycticejus atratus, *Blyth, Cat. Mammal. Mus. As. Soc. Beng.* no. 96; *Jerdon, Mamm. of India*, p. 38 (1867).

Vesperus atratus, *Dobson, Proc. As. Soc. Beng.* Sept. 1871, p. 212.

The head is broad and slightly elevated above the face; muzzle obtuse; glandular prominences largely developed, causing a heart-shaped depression above, behind the nostrils. Ears large, oval, with rounded tips, which, in the natural position of the ears, appear acute, owing to a longitudinal folding of the outer side of the conch on the inner, commencing at and almost bisecting the tip, as in the species of *Kerivoula*; inner margin convex; outer slightly hollowed beneath the tip, succeeded by a triangular emargination opposite

Fig. *b*.

the base of the tragus, and terminating in a rounded lobe, the summit of which is marked by a small triangular notch; tragus with a small rounded lobe at the outer side of its base, expanded above, convex externally and above, inner margin slightly concave.

Wings from the base of the toes; last rudimentary caudal vertebra free.

Fur rather long and dense, and (so far as can be determined from an examination of specimens in alcohol) intensely black throughout.

Fig. *c*.

Inner upper incisors very long and slightly bifid at the extremity; outer incisors minute, scarcely raised above the level of the gum, and close to the base of the inner incisors.

Length (of an adult ♀ preserved in alcohol), head and body 1″·9, tail 1″·8, head 0″·6, ear 0″·6, tragus 0″·23, forearm 1″·7, second finger 2″·9, fourth finger 2″, thumb 0″·2, tibia 0″·6, calcaneum 0″·5, foot and claws 0″·3.

Hab. Himalaya (Darjiling). Type in the Indian Museum, Calcutta.

Fig. *a*.

5. Vesperugo serotinus.

Vespertilio serotinus, *Schreb. Säugeth.* i. p. 167, pl. 53; *Kuhl, Ann. Wetterau. Naturk.* iv. p. 45 (1819); *Desmarest, Mammalogie*, p. 131 (1820); *Bell, Brit. Quadr.* p. 34, woodcut (1837).
Vespertilio noctula, *Geoff. Ann. du Muséum*, viii. p. 193.
Vespertilio murinus, *Pallas, Zoogr. Rosso-Asiat.* i. p. 121.
Vespertilio isabellinus, *Temm. Monogr. Mammal.* ii. p. 205.
Scotophilus serotinus, *Gray, May. Zool. & Bot.* ii. p. 497 (1838); *Jerdon, Mamm. of India*, p. 34 (1867).
Vesperugo (Vesperus) serotinus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 312; *Wagner, Suppl. Schreb. Säugeth.* v. p. 732 (1855); *Blas. Fauna Deutschl.* p. 76 (1857).
Vespertilio turcomanus, *Eversm. Bullet. de Moscou*, 1840, p. 21.
Scotophilus pachyomus, *Tomes, P. Z. S.* 1857, p. 50.
Vespertilio (Vesperus) mirza, *Philippi, Viaggio in Persia.*
Vesperus bottæ, *Peters, MB. Akad. Berl.* 1869, p. 406.
Vesperus shiraziensis, *Dobson, J. A. S. B.* 1871, p. 459.

Head flat, almost level with the face-line; muzzle thick, conical; glandular prominences less developed than in the species of the subgenus *Vesperugo*; nostrils opening sublaterally, separated by a narrow, slightly concave space. Ears slightly shorter than the head; laid forward, the tips extend more than midway between the eye and the end of the nose; inner basal lobe rounded, lower third of the inner margin very convex forwards, the upper two thirds faintly convex, broadly rounded at the tip; the upper half of the

outer margin straight, then slightly convex, emarginate opposite the base of the tragus, and terminating in a convex lobe ending on a level with the corner of the mouth directly below the posterior

Fig. *b*.

angle of the eye. Tragus about twice as long as broad, reaching its greatest width slightly above the base of the inner margin, then slightly convex and obtusely pointed above.

Thumb with a small callosity at the base. Wing-membrane from the metatarsus. Postcalcaneal lobe shallow. Last two caudal vertebræ free, the projecting portion of the tail nearly as long as the thumb.

The face is covered with very short fur; but the upper lip is fringed with straight hairs, which also cover the chin, radiating outwards from a small central wart beneath. The fur of the back is moderately long, and scarcely extends upon the wing-membrane, except in the immediate vicinity of the sides of the body and on the interfemoral membrane at the root of the tail; beneath, the wing-membrane is covered to a greater extent, and fine thinly spread hairs pass out along the posterior margin of the humerus and fore-arm to the carpus. The fur of the abdomen scarcely extends to the interfemoral membrane; but very fine, almost invisible hairs arise from the transverse dotted lines with which it is marked.

The colour of the fur varies very considerably, and has led to the great number of names by which the species has been described. The colour appears to depend in some degree upon the humidity of the countries inhabited. Thus specimens from Baluchistan, Persia, and Arabia, dry sandy districts, are brownish buff or even straw-coloured on the upper surface, beneath even paler; while those from Europe are commonly dark smoke-brown above and paler brown beneath.

Fig. *c*.

Upper inner incisors long and strong, bifid at their extremities, the inner cusp longer than the outer one; outer incisors very short,

scarcely more than one third of the inner incisors, and lying against the outer and anterior sides of their bases. Lower incisors bifid, crowded. The first lower premolar about half the vertical extent of the second, and about half its transverse diameter.

Length (of an adult ♀ from Persia), head and body 2″·9, tail 2″·3, head 1″, ear 0″·85, tragus 0″·35, forearm 2″·25, thumb 0″·4, second finger 3″·8, fourth finger 2″·7, tibia 0″·95, foot and claws 0″·5.

Hab. The temperate regions of Asia as far east as the Himalaya, as far south as Kashmir, Persia, Baluchistan, and Arabia; extending also throughout Europe to England, and southwards to the African continent as far as the mountain-ranges about the Gaboon.

I have examined the type of *Vesperus bottæ*, Peters, in the Paris Museum, and have no hesitation in referring it to this species. It agrees in all respects with specimens of this species from Persia, except in size; but although smaller, the measurements are relatively the same except in the bones of the second and third fingers, which, by their shortness, show that the specimen represents a not fully grown individual.

Vesperus shiraziensis was described by me from dried specimens of the Serotine sent by Major St. John from Shiraz, which had become much distorted by the drying-process, and in which also the tail had been withdrawn. The differences thus produced, and the very light colour of the fur, led me to believe these specimens distinct from European specimens of the Serotine, especially as I had not then recognised the unimportance of the colour of the fur, and the variation it is subject to according to the dryness or humidity of the countries inhabited.

Fig. *a*.

Fig. *b*.

6. Vesperugo andersoni.

Vesperus andersoni, *Dobson, Proc. As. Soc. Beng.* Sept. 1871, p. 211.

Head broad and flat; muzzle thick; nostrils opening sublaterally, without intervening emargination; ears moderate, with rounded tips, inner margin convex, with a small lobe at the base, outer edge with a shallow but wide emargination beneath the tip, then convex, and again emarginate opposite the base of the tragus, terminating by forming a small lobe midway between the base of the tragus and the angle of the mouth; tragus obtusely pointed, broadest slightly below the middle, inner margin straight, outer margin with a small rounded lobe at the base, succeeded by a shallow emargination, then convex upwards to its junction with the inner margin.

Toes longer than half the whole foot. Tail of eight vertebræ, the last vertebra free.

The fur of the head and body is moderately long and dense; anteriorly it passes forwards upon the face in front of the eyes as far as the commencement of the glandular prominences of the upper lip, from which only a few long hairs arise; the portion of the face about the eye and in front of the base of the inner margin of the ear is also naked; but the space between the base of the tragus and the angle of the mouth is covered with long hair. In front the ears are naked, except where a few very short hairs appear on the upper and inner side of the conch; posteriorly, the fur of the head encroaches on their bases, but more than one half of their posterior surfaces is completely naked. On the upper surface the fur of the back extends upon the wing-membrane as far as a line drawn from the junction of the proximal and middle thirds of the humerus to the middle of the femur; posteriorly it extends as far only as the root of the tail; and the interfemoral membrane has but a few very fine hairs dusted over its anterior surface as far as the end of the second caudal vertebra. Beneath, the distribution of the fur on the wing-membranes is similar to that on the upper surface, but somewhat more extended; a line of fine thinly spread hairs passes out along the posterior margin of the humerus and forearm to the carpus; posteriorly, the fur of the abdomen covers the root of the tail only, and three fourths of the surface of the interfemoral membrane is occupied by a few thinly spread, very fine, minute hairs.

Fur, above, dark brown with greyish tips; beneath, light greyish brown for two thirds the length of the hairs, the remaining portion ashy.

Fig. *c*.

Inner incisors slanting inwards, long and bifid; outer incisors very short and acutely pointed; placed in front of the inner incisors, and lying on their outer sides, slightly exceeding in vertical extent the cingulum of the inner incisors. Lower incisors crowded in the narrow space between the canines.

This species resembles *V. serotinus* generally; but the comparatively smaller and narrower ears at once distinguish it. Added to this the extremity of the tail does not project by the last two vertebræ as in *V. serotinus*, the last caudal vertebra being alone free. The differences between the species in the distribution of the fur are described above.

The following measurements have been taken from two perfectly

adult specimens, preserved in alcohol, obtained by Dr. J. Anderson during the first expedition to Yunan.

	1.	2.
	in.	in.
Length, head and body	2·6	2·55
„ tail	1·9	1·9
„ head	0·95	0·9
„ ear (anteriorly)	0·75	0·75
Breadth, ear „	0·48	0·48
Length, tragus	0·3	0·3
Breadth, „	0·1	0·1
Length, forearm	2·15	2·15
„ thumb	0·35	0·35
„ second finger	3·6	3·65
„ fourth „	2·6	2·5
„ tibia	0·83	0·85
„ calcaneum	0·7	0·7
„ foot and claws	0·4	0·4

Hab. Momein, Yunan.

Type in the collection of the Indian Museum.

7. Vesperugo doriæ.

Vesperus (Hesperoptenus) doriæ, *Peters, MB. Akad. Berl.* 1868, p. 626.

Ears quadrilateral, rounded, not emarginate, the outer margin terminating in a distinct lobe near the angle of the mouth; tragus rounded at the tip and curved inwards, reaching its greatest width immediately below the middle of the inner margin. A small lobule at the base of the outer margin. Metacarpal bones of the fingers nearly equal in length.

Wing-membrane from the base of the toes; tail wholly included within the interfemoral membrane; postcalcaneal lobe distinct.

Penis with a small but distinct bone.

Fur light brown, somewhat darker at the base of the hairs.

Inner upper incisors long and unicuspidate; the outer incisor on each side very small, scarcely rising above the surface of the gum. Lower incisors crowded.

Length (of an adult ♂), head and body 2″, tail 1″·6, head 0″·6, ear 0″·6 × 0″·48, tragus 0″·26, thumb 0″·28, second finger 3″, fourth finger 1″·9, tibia 0″·7, calcaneum 0″·6, foot 0″·25.

Hab. Borneo (Sarawak).

This species was made the type of a new subgenus, *Hesperoptenus*, by Dr. Peters, on account of the extremely small size of the inner upper incisors, the presence of a distinct bone in the penis, and other characters in which it differs from all the preceding species of the subgenus *Vesperus*. I have not seen the type specimen; but I think it is closely allied to *V. tickelli*, which has also a distinct bone in the penis, and in which also the external upper incisor on each side is not only small but is placed posterior to the canine and inner incisor. Most probably, when specimens of these species are compared, it will be found that they can both be included in the subgenus *Hesperoptenus*.

Fig. *a*.

8. Vesperugo tickelli.

Nycticejus tickelli, *Blyth, J. A. S. B.* xx. p. 157.
Nycticejus isabellinus, *Horsfield, Cat. Mam. Mus. E.I. Co.* (1851).

Head broad and flat; muzzle obtuse; glands of upper lip well developed; nostrils without intervening emargination, scarcely raised beyond the level of lip; lower lip with a simple naked space in front; ears moderate, rounded above, outer side straight or very slightly convex, emarginate opposite the base of the tragus, and terminating in a small rounded lobe, in front of which, and between it and the angle of the mouth, a small wart is placed; tragus lunate,

Fig. *b*.

outer margin very convex, inner slightly concave, rising from a narrow base, with the usual small rounded lobe at the outer side.

Tail long, last vertebra free; postcalcaneal lobe distinct; feet short.

The fur of the head extends forwards upon the face to a greater distance and in greater amount than in other species of this genus. The face is covered rather densely with fur as far as the commencement of the nostrils; a narrow space above the eyes, the sides of the face in front of the ears, and the glandular prominences of the upper lip are thinly clothed with short thinly spread hairs. The posterior and inner surface of the ear is densely covered with short fur. Laterally, the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint, and thence backwards to the ankles along the outer side of the tibia; posteriorly the upper surface of the interfemoral membrane is densely covered at the root of the tail, and the fur extends backwards as far as a line drawn between the ankle-joints, becoming shorter and more thinly spread; the tibia is clothed with short dense fur, which also clothes the back of the foot, extending to the base of the claws. Beneath, the fur of the body extends thickly upon the wing-membrane as far as a line drawn from the elbow- to the knee-joint, and also posterior to the forearm, in a band nearly

half an inch wide, to the carpus. The interfemoral membrane is thickly covered at its base, the fur quickly thinning out backwards into a few very short hairs occupying almost half its surface.

Fur pale straw-brown above, the bases of the hairs pale brown or buff; beneath pale buff.

Viewed anteriorly the upper incisors appear to be two in number only, and resemble those in the genus *Scotophilus* (p. 119), being unicuspidate and placed near the canines. In the angle behind the inner incisor and canine on each side the short outer incisor is placed, the summit of which is but slightly raised above the gum, and, seen through the small interval between the bases of the inner incisor and canine, appears as if it were a posterior basal cusp of the inner incisor. Lower incisors placed across the direction of the jaws, but not much crowded.

Length (of an adult ♂ preserved in alcohol), head and body 2″·65, tail 2″, ear 0″·75, tragus 0″·35 × 0″·15, forearm 2″·2, thumb 0″·42, second finger 4″·2, fourth finger 2″·9, tibia 0″·9, foot and claws 0″·45, calcaneum 0″·9.

Hab. Peninsula of India (Chaibasa, Jashpur, Sirguja).

Type in the collection of the Indian Museum, Calcutta.

This species appears to connect *Vesperugo* with *Chalinolobus*, a genus represented in Africa and Australia only. It resembles the species of that genus in the form of the head and of the ear and tragus, and in the dentition, but more remarkably in the very peculiar form of the penis, which has a distinct bone and a large saccular prepuce with a horizontal horseshoe-shaped opening above.

Incisors $\frac{2-2}{6}$, *pm.* $\frac{2-2}{2-2}$; *tragus as in* Vesperugo, *but the lobule at the base of its outer margin very small or absent, postcalcaneal lobe distinct; wings from the base of the toes;* base of the thumbs and soles of the feet with fleshy pads. Subgenus GLISCHROPUS*.

Vesperugo tylopus.

Vesperugo tylopus, *Dobson, P. Z. S.* 1875, p. 473.

Muzzle broad and evenly rounded in front; nostrils opening on a level with the glandular prominences on each side, and without intervening emargination; glands of the upper lip greatly developed, forming smooth, almost naked prominences, causing a furrow along the centre of the face behind the nostrils. Ears triangular, narrowed above, with rounded tips, the ascending part of the inner margin very faintly convex, nearly straight; the upper third of the outer margin straight, succeeded by a considerable convexity, causing the upper third to appear concave, then distinctly angularly emarginate opposite the base of the tragus, and terminating in a well-defined lobe midway between the base of the tragus and the angle of the mouth, but on a lower level than the mouth. This angular emargination and round terminal lobe are even better-defined than

* Dobson, P. Z. S. 1875, p. 472.

in *V. nanus*. Tragus faintly concave along the inner margin, outer margin slightly convex, tip obtusely rounded off; a minute very acutely pointed projection slightly above the base of the outer margin.

Thumb rather long; *the whole of the lower surface of the basal half occupied by a naked rounded callosity* of a pale yellow colour (in alcohol), with transverse wrinkles; the sole of the foot is similarly formed, but the surface is flat or slightly concave. The light yellow colour of the callosities or elastic and adhesive pads of the thumbs and feet contrasts remarkably with the very dark colour of the integument of the surrounding parts.

Postcalcaneal lobe distinct; extreme tip of tail projecting. Inner upper incisors long, bifid, the smaller cusp placed posteriorly and externally near the extremity; outer incisors very short, but in cross section equal to the inner ones, placed in a plane slightly anterior, the single cusp sloping inwards and lying against the cingulum of the inner incisors. Lower incisors trifid, not crowded. First upper premolar internal, but visible from without.

Length, head and body 1″·55, tail 1″·5, head 0″·55, ear 0″·5, tragus 0″·2, forearm 1″·2, thumb 0″·26, second finger 2″·4, fourth finger 1″·65, tibia 0″·55, foot and claws 0″·26.

Hab. North Borneo.

Type in the collection of the British Museum.

To this subgenus belongs also *Vesperugo nanus*, Peters, from Africa.

Incisors $\frac{2-2}{6}$, *pm.* $\frac{1-1}{2-2}$; *tragus as in* Vesperugo, *postcalcaneal lobe distinct; wings from the base of the toes;* base of the thumbs and soles of the feet with broad fleshy pads; *crown of the head remarkably flattened.* Subgenus TYLONYCTERIS, Ptrs.

Vesperugo pachypus.

Vespertilio pachypus, *Temminck, Monogr. Mammal.* ii. p. 217, pl. 54. figs. 4–6.

Vesperus pachypus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 741 (1855); *Dobson, P. A. S. B.* 1871, p. 212.

Scotophilus fulvidus, *Blyth, J. A. S. B.* xxviii. p. 293.

Tylonycteris pachypus, *Peters, MB. Akad. Berl.* 1872, p. 704.

Tylonycteris meyeri, *Peters, l. c.* p. 705.

Crown of the head very flat, not raised above the broad and flattened muzzle; nostrils not projecting, directed forwards and slightly downwards. Ears shorter than the head, triangular, with rather broadly rounded tips; outer margin straight, terminating towards the angle of the mouth in a small lobe separated by a shallow notch: tragus short, slightly narrowed upwards and rounded off above, reaching its greatest width opposite the base of the inner margin; at the base of the outer margin a small triangular lobule.

Under surface of the base of the thumbs and soles of the feet with broad fleshy pads. In some specimens the pad extends along the inferior surface of the thumb almost to the base of the claw, which is very small and acutely pointed, as in *V. noctula*. On the foot the

fleshy sole forms almost a circular disk, especially towards the toes, under which its round margin projects slightly. The toes are short, not exceeding half the foot in length, and are armed with short claws.

Wings rather short; wing-membrane from the base of the toes. Tail projecting by the extreme tip only; calcaneum short and feeble.

Fur fine and very dense, moderately long, scarcely extending upon the membranes; above, generally bright reddish brown, paler beneath.

Upper incisors short, the second and shorter outer cusp of the inner incisor exceeding very slightly in vertical extent the unicuspidate outer incisor; lower incisors trifid, not crowded.

I have examined the type of *Tylonycteris meyeri* from the Philippine Islands, and believe it to be an example of a not fully adult specimen of this species.

The following measurements have been taken from an adult female specimen from Java, preserved in alcohol, in the Leyden Museum :—

Length, head and body 1″·75, tail 1″·3, ear 0″·48, tragus 0″·2, forearm 1″·1, thumb 0″·22, second finger 2″, fourth finger 1″·4, tibia 0″·45, foot and claws 0″·25.

Hab. Peninsula of India (Darjiling); Tenasserim Province; Andaman Islands; Sumatra, Java, Philippine Islands.

In this species, as in *V.* (*Glischropus*) *tylopus* also, the fleshy foot-pads without doubt enable the animal to cling to the under surfaces of large leaves and fruits—perhaps not so effectively, however, as the much more highly specialized pedunculated sucking-disks of *Thyroptera tricolor* from the American continent enable that animal to adhere to smooth surfaces as securely as a fly.

Incisors $\frac{2-2}{6}$, *pm.* $\frac{2-2}{2-2}$; *tragus moderately long, narrow above; outer margin straight, or slightly concave above; no postcalcaneal lobe.* Subgenus ALOBUS, Ptrs.

Fig. *a*.

Vesperugo annectens.

Pipistrellus annectens, *Dobson, P. A. S. B.* 1871, p. 213.

Head slightly elevated; face hairy; glandular prominences of the upper lip small; ears pointed, with rounded tips, outer margin deeply hollowed out immediately below the tip, then convex, again slightly concave opposite the base of the tragus, and terminating by forming a small rounded lobe; tragus long, subacutely pointed, inner

margin almost straight, outer slightly convex, with a small rounded lobe at the base.

Fig. *b*.

Extreme tip of tail free; no membranous lobe on posterior margin of calcaneum.

Fur, so far as can be ascertained from the inspection of a specimen in spirit, above dark brown with paler tips; beneath brown, reddish towards the tip.

The fur of the head extends upon every part of the face, except the nostrils, forming a thick fringe along the margin of the upper lip; the parts beneath the eyes and the glandular prominences are not so densely covered as the remaining portions.

On the wing-membrane the fur of the body extends, above and beneath, nearly as far as a line drawn between the middle of the humerus and the knee-joint; the remaining portions of membrane are quite naked. The interfemoral membrane is covered above at the root of the tail, and beneath to a similar extent.

Upper incisors nearly equal; of the pair on each side the inner incisor is slightly notched at its extremity; canines small, scarcely exceeding the second premolar in the upper jaw in vertical extent; in the lower jaw the second premolar slightly exceeds the canine; first upper premolar minute, placed slightly inside the tooth-row, but distinctly visible from without.

This species unites the external appearance of a *Vespertilio* to the dentition of *Vesperugo*. In the form of the ear and tragus, and elevation of the roof of the skull above the face, it very closely resembles some species of the former genus.

Length, head and body 2″, tail 1″·6, head 0″·75, ear 0″·6, tragus 0″·3 × 0″·07, forearm 1″·8, thumb 0″·3, second finger 3″, fourth finger 2″·1, tibia 0″·75, calcaneum 0″·7, foot and claws 0″·3.

Hab. Naga hills, Assam.

Type in the collection of the Indian Museum, Calcutta.

To this subgenus belong also *Vesperugo temminckii*, Cretzsch., and *V. pulcher*, Dobson, from Africa. These species appear to connect the genera *Vesperugo* and *Vespertilio*.

The next subgenus approaches *Scotophilus* (p. 119) in the single pair of upper unicuspidate incisors placed close to the canines, but in all other characters agrees with *Vesperugo*. The first lower premolar is not crushed in between the canine and second premolar, as in all the species of *Scotophilus*, but is slightly inclined outwards, in the manner so characteristic of *Vesperugo*.

Incisors $\frac{1-1}{6}$, *pm.* $\frac{2-2}{2-2}$; *the single upper incisor on each side close to the canine as in* Scotophilus; *premolars and molars as in the subgenus* Vesperugo; *first minute upper premolar deciduous.* Subgenus SCOTOZOUS*.

Vesperugo dormeri.

Scotozous dormeri, *Dobson, P. Z. S.* 1875, p. 373.

Crown of the head scarcely raised above the face-line; glands between the nostrils and eyes well developed, but not causing a depression between them on the muzzle; nostrils opening sublaterally, the space between divided in the centre by a narrow vertical ridge passing downwards to the lip as in *Vesperugo pipistrellus*: ears shorter than the head, triangular, with rounded tips; upper third of the outer margin of the ear faintly concave, then gradually convex, again slightly concave opposite the base of the tragus, and terminating in a rounded lobe below the eye, on a level with the angle of the mouth. Tragus with a small triangular lobe near the base of the outer margin; outer and inner margins parallel as far as the upper third of the outer margin, where the outer margin slopes suddenly upwards and inwards, meeting the inner margin at an angle.

Thumb armed with a strongly curved claw; postcalcaneal lobe distinct, triangular; tip of tail projecting; wings from the base of the claws; foot rather large, first toe nearly equal to the others in length.

Fur, above brown, the extreme tips ashy; beneath darker brown, the terminal third of the hairs white.

A single large and acutely pointed unicuspidate incisor on each side above, directed forwards and inwards; this tooth almost touches the canine by its base; but its summit is closer to its fellow of the opposite side, owing to its direction inwards; from the outer side of its cingulum a very small spur projects. Second upper premolar large, equal to three fourths the canine in vertical extent, and placed close to it; in the small triangular space inside, between it and the canine, a minute premolar may be seen with the aid of a lens, not visible from without. Posterior upper molar equal to half the antepenultimate molar. Lower incisors crowded; middle incisors slightly larger than the others, all distinctly trifid; lower canines without a cusp from inner margin of cingulum. First lower premolar shorter than the second premolar, but in transverse diameter rather greater, nearer by its summit to the second premolar than to the canine.

Length, head and body 1″·5, tail 1″·15, head 0″·6, ear 0″·45, tragus 0″·18, forearm 1″·25, thumb 0″·25, second finger 1″·85, fourth finger 1″·4, tibia 0″·4, foot and claws 0″·28.

Hab. Southern India (Bellary hills).

Type in the collection of the British Museum.

To the same subgenus belongs *Vesperugo schliefenii* (=*Scotophilus schliefenii*, Peters) from Egypt. In that species the upper incisors are much smaller than in *V. dormeri*, the first upper premolar is deciduous, and the lower incisors are not crowded.

* Gen. *Scotozous*, Dobson, P. Z. S. 1875, p. 373.

SCOTOPHILUS.

Scotophilus, *Leach, Trans. Linn. Soc.* 1822, xiii. p. 71; *Peters, MB. Akad. Berl.* 1866, p. 679; *Dobson, P. Z. S.* 1875, p. 369.

Nycticejus*, *Temminck, Monogr. Mamm.* ii. p. 148 (1840); *Peters, Reise nach Mossambique, Säugeth.* p. 65 (1852); *Blyth, J. A. S. B.* xx. p. 157 (1851); *Jerdon, Mammals of India*, p. 37 (1867).

Muzzle short, obtusely conical, smoothly rounded off, naked; nostrils close together, opening by simple lunate apertures in front or sublaterally, their inner margins projecting; ears longer than broad, generally considerably shorter than the head, with rounded tips, the outer margin terminating near the angle of the mouth; tragus tapering, generally subacutely pointed and curved inwards.

Tail shorter than the head and body, contained, except the terminal rudimentary vertebra, within the interfemoral membrane; calcaneum weak; wing-membrane attached or close to the base of the toes.

Fur generally short and nearly confined to the body; wing- and interfemoral membranes very thick and leathery.

Skull thick, with prominent crests; occipital and sagittal crests often forming at their junction behind a thick projecting process from which the skull slopes evenly downwards and forwards to the end of the nasal bones in front.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

An additional external incisor on each side above in the young. Upper incisors long, unicuspidate, acute, close to the canines by their bases (rarely separated by a small space); upper premolar large, exceeding the molars in vertical extent, and placed quite close to the canine; first lower premolar small, *crushed in between the canine and second premolar*, which exceeds the molars in vertical extent.

Range. Africa, Asia, and Australia. In Asia confined to the warmer parts, extending from Afghanistan to Southern China and the Philippine Islands, and generally distributed throughout the Malay archipelago.

This genus, though difficult to define, and approaching *Vesperugo*, Keys. & Blas., in many points, especially through certain species of that genus, contains a very natural group of Bats of very wide distribution through the tropical and subtropical regions of the eastern hemisphere. They are distinguished specially by possessing a single pair of upper incisors, separated by a wide space and placed close to the canines; by the small transverse first lower premolar crushed in between the approximated canine and second premolar, yet standing in the tooth-row; and, generally, by their short, conical, naked muzzle and rather short and narrow ears, by their heavy bodies and strong limbs, with remarkably thick and nearly naked leathery membranes, and by their short fur, generally olive- or chestnut-brown above, and yellowish or reddish white beneath.

* The generic term *Nycticejus* was first used by Rafinesque (Journ. de Physique, 1819, p. 417) for a species of Bat from North America, with two upper incisors, as in *Scotophilus*, but in other respects more closely related to the species of *Vesperugo*. The term *Nycticejus* cannot therefore be applied to the species of Bats included under the above definition.

Synopsis of Subgenera and Species.

A. Internal basal lobe of the ear angular; inferior margin straight, forming with the ascending margin almost a right angle; tragus with a narrow prominent ridge passing across its front surface from the base of its inner margin ..... Subgenus *Scotophilus*.

a. Upper incisors close to canines; premaxillary bones very narrow, leaving a wide space between them in front; nasal opening in skull very large.

α. Cingulum of the upper incisors very narrow..... 1. *S. temminckii*, p. 120.

β. Cingulum of the upper incisors forming a broad horizontal shoulder behind, scarcely raised above the level of the gum..... *S. borbonicus**, Geoff.

B. Internal basal lobe of the ear convex, evenly rounded; front surface of the tragus smooth ..... Subgenus *Scoteinus*.

a'. Ears nearly as long as the head; internal basal lobe commencing in a long lobule projecting backwards ..... 2. *S. emarginatus*, p. 123.

b'. Ears much shorter than the head; internal basal lobe commencing in a short lobule.

γ. Cingulum of the upper incisors with a small cusp posteriorly ..... *S. rüppellii*, Peters.

δ. Cingulum of the upper incisors without a posterior cusp ..... *S. greyii* (Gray), Dobson.

b. Upper incisors separated from the canine by a short space; premaxillary bones more developed; nasal opening small.. Subgenus *Scotomanes*.

ε. Cingulum of the upper incisors with a distinct cusp posteriorly ..... 3. *S. ornatus*, p. 124.

Fig. *a*.

1. Scotophilus temminckii.

Scotophilus ? kuhlii, *Leach, Trans. Linn. Soc.* xiii. p. 71 (1822).
Vespertilio temminckii, *Horsfield, Zool. Researches in Java* (1824).
Vespertilio belangeri *et* noctulinus, *Is. Geoff. Bélang. Voy. aux Indes Orient.* (1834) pp. 87 & 92, pl. 3.
Vespertilio castaneus, *Gray, Illustr. Indian Zool.*
Scotophilus temminckii, *Gray, Mag. Zool. & Bot.* ii. p. 497; *Peters, MB. Akad. Berl.* 1866, p. 679; *Dobson, P. Z. S.* 1875, p. 370.

* This and the other species distinguished in the synopsis, but not accompanied by a number, have not been found in Asia; but I have introduced their names here for the purpose of showing the position of the Asiatic species.

Nycticejus temminckii, *Temm. Monogr. Mammal.* ii. p. 149; *Wagner, Suppl. Schreb. Säugeth.* i. p. 541 (1841), v. p. 764 (1855); *Cantor, J. A. S. B.* 1846, xv. p. 185; *Blyth, J. A. S. B.* 1851, p. 157; *Horsfield, Cat. Mamm. Mus. E. I. Comp.* p. 37 (1851); *Blyth, Cat. Mamm. Mus. As. Soc. Beng.* p. 31 (1863).

Nycticejus luteus, *Blyth, J. A. S. B.* xx. p. 157, xxi. p. 346; *Wagner, Suppl. Schreb. Säugeth.* v. p. 765 (1855).

Nycticejus flaveolus, *Blyth, Horsfield in Cat. Mamm. Mus. E. I. Comp.* p. 37 (1851).

Muzzle thick, obtusely conical; head slightly raised above the face-line; glandular prominences between the eyes and nose small, not causing a depression on the muzzle above. Ears short, narrow, and rounded at the tips; the inner basal lobe square below, the horizontal part of its margin straight, forming a right angle with the ascending portion, the lower half of the ascending part of the inner margin straight or even faintly concave, the upper half convex, the tip not projecting outwards; from the summit of the ear the outer margin slants slightly outwards and downwards for a short distance, then becomes straight and slightly reflected outwards as far as a point opposite the base of the tragus, where it is deeply emarginate,

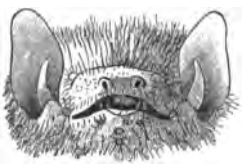

Fig. *b*.

and beyond which it terminates in a very convex short lobe. Tragus narrow, attenuated towards the tip, acutely pointed, much curved forwards and inwards; the lower third of the outer margin straight, with a distinct small horizontal lobule at the base, the upper two thirds convex; inner margin concave; from the base of the inner margin a narrow prominent ridge passes outwards and slightly upwards across the anterior surface of the tragus to the outer margin.

Wing-membrane attached to the side of the foot near the base of the toes; postcalcaneal lobe narrow; extremity of the tail projecting.

On the upper surface the fur of the body is almost wholly confined to the body, scarcely extending in any direction upon the wing-membrane; beneath, the wing-membrane is covered with fine hairs as far as a line drawn from the elbow- to the knee-joint; the interfemoral is naked, except where a few scattered hairs appear at the base of the tail.

The colour of the fur varies very much in different individuals, and according to season and age. It appears to vary, however, within certain limits. Generally dark olive-brown above, and reddish or yellowish white beneath; in some specimens deep chestnut throughout, or the inferior surface is bright chestnut or rich canary-colour.

In fully adult and aged animals the skull is thick, with prominent crests; the occipital and sagittal crests form at their junction a thick

projecting process, from which the skull slopes evenly downwards and forwards to the end of the nasal bones in front; occiput concave, with prominent occipital crest; facial bones much shortened in front of the infraorbital foramina, which are large and well defined; the bony palate very narrow behind the last molar, extending backwards as far as the middle of the zygomatic arches; basioccipital between cochleæ broad; cochleæ partially concealed by the tympanic bullæ; paroccipital and mastoid processes well developed, prominent.

Length (of an adult ♂), head and body 3″·1, tail 2″·1, head 1″, ear 0″·65, tragus 0″·38 × 0″·1, forearm 2″·3, thumb 0″·38, second finger 3″·65, fourth finger 2″·5, tibia 0″·9, foot and claws 0″·45.

Specimens of this species vary as much in length as they do in colour. Those from the islands of the Malay archipelago are generally smaller than those from the continent of Asia.

Hab. Peninsula of India; Ceylon; Burma; Southern China; Sumatra, Java, Borneo, and the Philippines.

Few collections of Bats made in India are without specimens of this species. This is most probably due to its early habits; it is always the first Bat to appear in the evening, and this and its large size render its capture comparatively easy.

S. temminckii.

S. heathii.

Subsp. **Scotophilus heathii.**

Nycticejus heathii, *Horsfield, P. Z. S.* 1831, p. 113; *Temminck, Monogr. Mamm.* ii. p. 148; *Blyth, J. A. S. B.* xxi. p. 157; *Wagner, Suppl. Schreb. Säugeth.* v. p. 764 (1855).

In general form and size very similar to *S. temminckii*, but in all measurements longer; the forearm, thumb, and tail are relatively longer, and the crown of the head appears less elevated above the face-line. The muzzle also seems more conical, owing to the greater breadth and more rounded form of the face.

S. heathii.

These differences will be better understood by examining and comparing the above woodcuts, which have been made from drawings

of perfectly adult specimens preserved in alcohol in the Indian Museum (Nos. 389 and 458 Ind. Mus.).

Length (of an adult ♂ preserved in alcohol), head and body 3″·2, tail 2″·5, head 1″·1, ear 0″·75 × 0″·5, tragus 0″·38 × 0″·1, forearm 2″·45, thumb 0″·45, second finger 4″, fourth finger 2″·75, tibia 1″, foot and claws 0″·5.

Hab. Peninsula of India (Coromandel and Malabar coasts; Rajanpur, Punjab frontier); Ceylon.

Fig. *a*.

2. Scotophilus emarginatus.

Nycticejus emarginatus, *Dobson, P. A. S. B.* 1871, p. 211.

Head broad and flat; muzzle thick and obtuse; glands of the upper lip largely developed, forming rounded prominences between the nostrils and eyes; nostrils opening level with intervening space; ears large, with broadly rounded tips; inner margin convex, with a rounded lobe at the base directed backwards and slightly outwards, passing in front of the inner margin of the tragus and resting on part of its anterior surface; outer side abruptly flatly emarginate

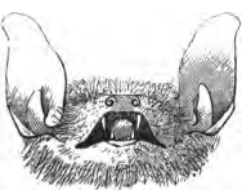

Fig. *b*.

beneath the tip, causing it to project outwards, again angularly emarginate opposite the base of the tragus, terminating in a rounded lobe with a wart in front between it and the angle of the mouth; tragus moderately long, slightly curved inwards and obtusely pointed, maintaining almost the same breadth from the base to within a short distance from the tip, where it suddenly diminishes in width.

Thumb long, armed with a large and strong claw; terminal phalanx about twice as long as basal. Tail of nine vertebræ, the last free.

The wing-membranes are completely devoid of hair, except in the immediate neighbourhood of the sides of the body, above and beneath; behind the fur of the back extends upon the interfemoral membrane,

covering about half its surface, rather densely at the root of the tail, but quickly thinning out into a few short scattered hairs, which also extend on the backs of the tibiæ to the feet; beneath, the membrane is naked, except at the root of the tail, where a few scattered hairs occur.

The body is clothed with short close fur, above tricoloured, at the base dark ferruginous brown, then buff, the tips light yellowish brown; beneath dark ferruginous brown at base, the remaining portion buff.

Length (of an adult ♂ preserved in alcohol), head and body 2″·9, tail 2″·2, head 0″·95, ear 0″·85, tragus 0″·3 × 0″·1, forearm 2″·2, thumb 0″·45, second finger 3″·7, fourth finger 2″·8, tibia 0″·85, calcaneum 0″·8, foot and claws 0″·55.

Hab. India, precise locality unknown.

Type in the collection of the Indian Museum, Calcutta.

Fig. *a*.

3. Scotophilus ornatus.

Nycticejus ornatus, *Blyth, J. A. S. B.* xx. p. 517; *Jerdon, Mamm. of India*, p. 39 (1867); *Dobson, P. Z. S.* 1875, p. 371.

Head very broad; muzzle short; glandular prominences of the upper lip well developed, seminude, bounded behind by a deep groove passing backwards and outwards on either side from the nostrils; in front of these grooves the long hair covering the head does not pass; ears moderate, triangular, with broadly rounded tips, outer side with a slight concavity beneath the tip, then convex, again emarginate opposite the base of the tragus, and terminating in a broadly rounded lobe; the small wart near the termination of the outer margin is not

Fig. *b*.

so well defined as in other species of the genus, and in some specimens is either absent or very small; tragus long, slightly narrowed above the small triangular lobe at the base, then somewhat expanded and again narrowed towards the tip, which is rounded off or subacutely

pointed, with a faint concavity immediately beneath on the inner margin. Tail long; last vertebra free.

Fur light isabelline brown, remarkably pied with white spots; on the top of the head a small longitudinal patch of pure white; from the back of the head for two thirds the length of the spine a narrow band of white extends; at the base of the ears posteriorly a patch of white; on each side of the body two white patches, one in front of, the other behind the head of the humerus; on the under surface a band of white round the neck connects the spots behind each ear, this is succeeded by a band of isabelline brown, followed by a band of white and succeeded by pale brown, which extends to the root of the tail. In a young specimen from Darjeeling the general colour is dark isabelline brown, and the narrow band of the same colour round the neck on the under surface is succeeded by glistening silvery white fur, which, becoming greyish posteriorly, extends over the whole ventral surface, interrupted only by a small patch of isabelline brown, on each side, immediately beneath the head of the humerus.

The position of the white patches is generally very constant; but their size varies, being greatest apparently in individuals of a pale rusty red colour; and these I have always found to be males; the females have much darker fur, and the white spots and bands are of less size and are occasionally altogether absent in some places.

If the skull of *S. ornatus* be compared with that of a full-grown specimen of *S. temminckii*, the following differences may be observed:—

In *S. temminckii* the superior angle of the occipital crest forms with the sagittal crest a prominent projection; in *S. ornatus* this projection is small, the sagittal crest is more developed in front, and the postorbital processes are larger. The frontal in *S. ornatus* is grooved in the centre; in *S. temminckii* it forms a plane surface. In *S. ornatus* the premaxillary bones are much more developed, and the nasal opening is not half the size of that in *S. temminckii*; the incisors also are placed at the inner side of the premaxillaries, and separated from the canines by a space. In *S. ornatus* the bony palate is much broader behind the last molars, and does not extend so far backwards.

In the upper jaw the teeth (with the exception of the incisors, which are separated from the canines and have an acute short posterior cusp) are very similar in both species; in the lower jaw the first premolar is less crushed in between the canine and second premolar than in any other species of the genus; it is, however, similarly flattened from before backwards, and has two short cusps arising internally from the cingulum, which are not found in the other species.

Length, head and body 3″·1, tail 2″·5, head 0″·9, ear 0″·95 × 0″·55, tragus 0″·4 × 0″·1, forearm 2″·35, thumb 0″·5, second finger 4″·2, fourth finger 3″, tibia 0″·9, calcaneum 0″·9, foot and claws 0″·5.

Hab. India (Darjiling, Khasia hills); Burma (Ponsee and Kakhyan hills); Yunan (Nantin and Sanda valley).

Type in the collection of the Indian Museum, Calcutta.

VESPERTILIO.

Vespertilio, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306; *Fauna Deutschl.* p. 78 (1857).

Muzzle long; glandular prominences between the nostrils and eyes small, scarcely increasing the width of the face; nostrils opening sublaterally by simple crescentic apertures; crown of the head vaulted, slightly elevated above the face-line: ears separate, oval, longer than broad, generally equalling at least, often exceeding the length of the head; the internal base lobe angular, the external margin terminating opposite the base of the tragus or very slightly in front of it; tragus long, generally acute; the inner margin slightly convex or straight; the outer margin convex below, straight or slightly concave above.

Tail less than (or very rarely equal to) the length of the head and body; postcalcaneal lobe absent or very small. Face hairy.

Incisors $\frac{2-2}{6}$; the upper incisors nearly equal; the summit of the outer incisor on each side directed vertically downwards or curved slightly outwards, that of the inner incisor directed forwards and inwards; the inner incisor on each side generally with a distinct second cusp placed posteriorly and externally: premolars $\frac{3-3}{3-3}$; first and second upper premolars very small, the second premolar often minute and pressed inwards: molars $\frac{3-3}{3-3}$; the last upper molar rather less than half the antepenultimate molar.

Range. Temperate and tropical regions of both hemispheres.

Subgenus I. LEUCONOË.

Feet very large; wing-membrane from the ankles or tarsus, rarely from the base of the toes; interfemoral membrane forming a very acute angle in the centre of its free margin behind; tail projecting by last vertebra or by last two vertebræ from the membrane; calcaneum very long, extending at least three fourths the distance between the ankle and tail*.

1. Vespertilio hasseltii.

Vespertilio hasseltii, *Temm. Monog. Mammal.* ii. p. 225 (1835–41); *Peters, Monatsb. Akad. Wissensch. Berl.* 1866, p. 18.

Vesperugo hasseltii, *Wagner, Suppl. Schreb. Säugeth.* i. p. 512 (1840), v. p. 740 (1855).

Trilatitus hasseltii, *Gray, Ann. & Mag. Nat. Hist.* x. p. 258 (1842).

Ears shorter than the head, and rather narrow; laid forwards the extremities reach very little further than half the distance

* No synopsis of the species of the genus *Vespertilio* is given, as the number of species recorded from all parts of the world is very great, and it would be necessary to give a synopsis of all in order to show the position of the Asiatic species.

I have therefore given full descriptions of all the species known with certainty to inhabit Asia, adding in footnotes descriptions of the two European species which have not yet been found there.

between the eye and end of the nose; they are shaped almost precisely similar to those of *V. macrotarsus*; the tips are broadly rounded, the outer margin forms a straight line from the tip to a point opposite the base of the tragus, where it is interrupted by a fold of the conch passing outwards to form the posterior margin of the small lobe in which the outer margin of the ear ends slightly in front of the inner margin. Tragus moderately long, narrow, and tapering to an acute point; the inner margin straight, the outer slightly convex, with a triangular lobe at the base; it is not so much attenuated towards the tip nor so acutely pointed as in *V. macrotarsus* (p. 130).

Wings from the ankles; feet very long and slender; interfemoral membrane large, acutely angular behind. Fur *very short* above and beneath; the muzzle in front of the eyes almost naked. The fur of the body scarcely extends upon the wing-membranes, except at their origin from the sides of the body; upon the interfemoral it extends slightly further back than a line drawn between the knee-joints. Beneath, the fur extends upon the wing-membrane as far as a line drawn from the elbow-joint to the commencement of the distal third of the femur; upon the interfemoral its extent is similar to that on the upper surface, but about half the surface of the membrane is covered thinly with minute hairs; tibia and feet (except at base of claws) quite naked on both surfaces.

Fur, above, dark at the base, with brown tips; beneath, dark brown or black, with white extremities.

The second premolar *in both jaws* is extremely small, and with difficulty seen even with a lens; it is placed in the angle between the first and third premolars, and in vertical extent does not equal the cingulum of either tooth; the lower incisors are slightly crowded.

Length (of an adult ♀ preserved in alcohol), head and body 2″·1, tail 1″·8, head 0″·65, ear 0″·6, tragus 0″·25, forearm 1″·6, second finger 2″·6, fourth finger 2″, tibia 0″·65, foot and claws 0″·45.

This species, as Dr. Peters has remarked, was long considered to belong to the genus *Vesperugo*, the extremely small second premolar in both jaws having escaped notice. Although the second *upper* premolar is very small in every species of *Vespertilio*, and in some quite internal, yet in no other species is the second lower premolar quite internal, placed in the angle between the closely approximated first and third premolars, and not sufficiently large to fill that angle.

Hab. Java, Sumatra, Malay peninsula, Siam*.

* I find, in the collection of the East-India Company at South Kensington, the skin of a Bat which cannot be distinguished from the type of *V. macropus*, Gould, and also resembles *V. horsfieldii*, Tem., very closely. This skin is labelled *Vespertilio adversus*, Horsfield; and if it be found hereafter that (as I have shown to be the case in certain species of *Rhinolophidæ*) the position of the premolars and place of attachment of the wing-membrane to the posterior extremities vary in different specimens of the same species of this genus, then both *V. horsfieldii* and *V. macropus* (as Dr. Peters thinks) must be considered

2. Vespertilio horsfieldii.

Vespertilio horsfieldii, *Temminck, Monogr. Mammal.* ii. p. 226 (1839); *Wagner, Suppl. Schreb. Säugeth.* v. p. 737 (1855).

Ears long and narrow; laid forwards the tips extend slightly beyond the end of the nose; lower third of inner margin straight, upper two thirds regularly convex; tip shortly rounded off; upper half of outer margin very concave, lower half convex, the convexity not commencing so abruptly as in *Vespertilio emarginatus*; tragus straight, subacutely pointed, attaining its greatest width opposite the base of its inner margin, the outer margin slanting thence upwards and inwards; at the base of the outer margin a horizontal lobule succeeded by an emargination; muzzle hairy, rather thick, the end of the nose projecting slightly beyond the lower lip.

Wings from the tarsus; feet very large and strong; interfemoral membrane as in other species of this section, but scarcely so acutely angular behind; extremity of tail free.

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identical with Horsfield's type, and his name, *V. adversus*, would of course have priority. As the number of specimens of these ? species obtained up to this time is not sufficient to determine this question, I am obliged to describe them as distinct, noting carefully in my descriptions every difference observed by me. As the type of *V. adversus*, Horsf., is a badly preserved skin, the following description has been taken from a specimen of *V. macropus*, Gould, from Australia:—

VESPERTILIO ADVERSUS.

Vespertilio adversus, *Horsf. Zool. Researches in Java* (1824).
Vespertilio macropus, *Gould, Mammals of Australia.*

The skull appears somewhat more elevated above the face-line than in *V. hasseltii*. The ear laid forward does not extend to the end of the nose; the inner margin of the ear-conch is very similar in shape to that of *V. dasycneme*, but there is a slight flattening in its upper third; the extremity is broadly triangular, with a rounded-off vertical angle; the upper half of the outer margin is straight, not at all concave, and the lower half very slightly convex, terminating opposite the base of the inner margin; tragus very similar in shape to that of *V. daubentonii*, but somewhat longer and narrower towards the tip, the inner margin straight, the outer slightly convex, attaining its greatest width slightly below the middle of the inner margin.

Wings from the ankles; calcaneum very long, extending more than three fourths the length of the posterior margin of the interfemoral on each side.

The fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the distal third of the femur; the base of the interfemoral between the thighs only is covered, and a few long hairs appear on the backs of the toes. Beneath, the wing-membrane is covered with a few fine hairs as far as a line drawn from the elbow to the knee, but the interfemoral is as naked as upon the upper surface. The face is more hairy than in most of the species of this subgenus.

The first upper premolar occupies the space between the canine and the third premolar; the second upper premolar is extremely small, *placed quite inside*, in the angle between the first and third premolars, and is not visible from without; the second lower premolar is about half the vertical height of the first, but not equal to one third its transverse diameter.

Length (of an adult ♀ preserved in alcohol), head and body 2″·1, tail 1‴·75, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·55, thumb 0″·35, second finger 2″·9, fourth finger 2″·05, tibia 0″·68, foot and claws 0″·48.

Hab. North Australia (Port Essington), Java.

On the upper surface the hair extends slightly upon the wing-membrane and upon the interfemoral between the thighs only; beneath, the base of the interfemoral is covered with soft hairs, and the greater part of the remaining surface with fine thinly spread hairs.

The second upper premolar is very small and internal; second lower premolar about half the size of the first, but quite distinct and standing in the tooth-row.

Length (of an adult ♀ preserved in alcohol), head and body 1″·95, tail 1″·5, head 0″·7, ear 0″·6, tragus 0″·3, forearm 1″·5, thumb 0″·3, second finger 2″·8, fourth finger 2″, tibia 0″·65, foot and claws 0″·42.

Hab. Java; Gerontalo, Celebes.

3. Vespertilio dasycneme.

Vespertilio dasycneme, *Boie, Isis*, 1825, p. 1200.

The ears are comparatively shorter than in *V. daubentonii*; laid forwards they do not reach the end of the nose; the inner margin of the ear is straight in its lower ascending portion for about one third its length, then regularly convex to the tip, which is obtusely rounded off; the outer margin is straight beneath the tip for about one third of its length, becoming gradually convex, and terminating abruptly opposite the base of the inner margin. The tragus terminates in an obtuse rounded point; the inner margin is slightly concave, the outer convex.

Thumb armed with a very large claw. Wings from the distal extremity of the tibia; the point of origin of the wing-membrane is very sharply defined. The calcaneum extends rather more than halfway between the ankle and the tail.

Fur above dark at the base, the hairs with light-brown extremities; beneath black at the base, the extremities white.

Both the first and second upper premolars are drawn inwards, owing to the proximity of the third large premolar to the canine; the second premolar is extremely small, and more internal than the first. The lower incisors are not crowded; the second lower premolar is about half the size of the first premolar; the third premolar is less than the canine in vertical extent.

Length, head and body 2″·4, tail 2″, head 0″·75, ear 0″·6, tragus 0″·3 × 0″·09, forearm 1″·8, thumb 0″·35, second finger 3″·1, fourth finger 2″·4, tibia 0″·8, calcaneum 0″·65, foot and claws 0″·4.

Hab. Northern Asia (Altai Mountains); Europe (from Russia to England).

4. Vespertilio capaccinii.

Vespertilio capaccinii, *Bonap. Fauna Italica*, 1832, fasc. xx.; *Temm. Monogr. Mammal.* ii. p. 189 (1835–41).
Vespertilio megapodius, *Temm. l. c.* p. 189.
Vespertilio macrodactylus, *Temm. l. c.* p. 231 (*vide Peters, in MB. Akad. Berl.* 1866, p. 679).

Ears long, laid forwards the tips exactly reach the end of the nose; upper third of the inner margin straight, tip shortly rounded

off; outer margin flattened beneath the tip, becoming convex opposite the summit of the tragus, and ending abruptly opposite the base of its inner margin. Tragus long and very acutely pointed, the lower half of the inner margin straight, the upper half convex, corresponding to a distinct concavity of the upper third of the outer margin, which gives to the upper part of the tragus an outward inclination; at the base of the outer margin a distinct small rounded lobe, above which the outer margin becomes strongly convex.

The wing-membrane is attached to the tibia a short distance above the ankle; calcaneum reaching three fourths the distance from the ankle to the tail.

On the upper surface the wing-membrane is covered with soft fur as far as a line drawn from the elbow to the tips of the toes when the foot is drawn outwards and forwards; the legs and interfemoral membrane are clothed with similar fur as far as a line drawn between the ankles; beneath, the wing-membrane is clothed as far as a line drawn between the elbow- and knee-joints, and the interfemoral as far as a line extending between the ankles; the hairs also cross the tibia and occupy the angle of the wing-membrane contained between its posterior margin and the tibiæ.

Fur, above, black at the base, with light-brown tips; beneath, black with white extremities.

The first and second upper premolars are slightly drawn inwards; the second premolar minute, not half the size of the first premolar, and scarcely equalling in vertical extent the cingulum of the third premolar; the second lower premolar is almost equal to the first in vertical extent, but is not half its transverse diameter; the third lower premolar is almost equal to the canine in vertical extent.

Length (of an adult ♀ preserved in spirits), head and body 2″, tail 1″·5, tail free from membrane 0″·15, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·6, thumb 0″·3, second finger 2″·55, fourth finger 2″, tibia 0″·7, calcaneum 0″·55, foot and claws 0″·5.

Hab. Japan; Philippine Islands; Southern Europe (Italy).

5. Vespertilio macrotarsus.

Vespertilio macrotarsus, *Waterhouse, Ann. & Mag. Nat. Hist.* vol. xvi. p. 51 (1845); *Wagner, Suppl. Schreb. Säugeth.* v. p. 740 (1855).

The ears laid forwards extend exactly to the end of the nose; inner margin of the conch straight in the lower ascending portion for about one third its length, then regularly convex, with a slight flattening in the upper third; the outer margin forms a straight line without interruption as far as a point opposite the base of the tragus, terminating in a small lobe opposite the base of the inner margin. Tragus straight and very acutely pointed; inner margin straight; lobe at base of outer margin small, succeeded by an emargination, above which the tragus reaches its greatest width.

Wings to the ankles; feet very large, the claws of an intensely black colour, contrasting with the prevailing light brownish hue of

the integuments. Calcaneum very long, extending to within a very short distance of the tail. The wing-membranes are *attached to the sides of the back* at a distance of about a quarter of an inch from the spine on each side; and the surface covered by hairs across the loins is scarcely more than half an inch in width.

Fur, above, dark brown, with paler tips; beneath, canary-colour, the bases of the hairs dark. The fur is everywhere very short, and scarcely extends to either the wing- or interfemoral membrane.

Dentition as in *V. capaccini*. The second lower premolar scarcely more than half the height and less than one third the size of the first premolar.

This species is at once distinguished by the attachment of the wing-membranes and by the intensely black colour of the claws.

Length (of the type specimen, an adult ♀, preserved in alcohol), head and body 2″·2, tail 2″·1, head 0″·75, ear 0″·78, tragus 0″·35, forearm 1″·8, thumb 0″·35, second finger 3″·6, fourth finger 2″·4, tibia 0″·7, calcaneum 0″·9, foot and claws 0″·55.

Hab. Philippine Islands. (Type in the British Museum.)

6. Vespertilio longipes.

Vespertilio macropus, *Dobson (non Gould)*, *P. A. S. B.* 1872, p. 209.
Vespertilio longipes, *Dobson*, *P. A. S. B.* 1873, p. 110.

Crown of the head rather abruptly raised above the face-line; muzzle narrow and pointed, with slightly projecting nostrils opening sublaterally, with an intervening emargination. The shape of the head and muzzle is similar to that of *Kerivoula hardwickii*. Ears narrow, tapering, with rounded-off tips; immediately beneath the tip about half the outer margin is hollowed out, the remaining lower half convex. Tragus very long and slender, slightly tapering towards the tip, which is rounded off.

Wings from the ankles. Feet very large, about one fourth the length of the head and body; toes more than half the length of the whole foot, claws remarkably long and strong; the outer toe considerably shorter than the others, and with a somewhat larger claw.

Fur above black; beneath black, with whitish tips. The face is very hairy, and the upper lip is clothed with long straight hairs. The wing-membrane on the upper surface is covered with hair as far as a line connecting the junction of the proximal and middle thirds of the humerus with the knee-joint; from the knee the hairs pass backwards along the tibia to the back of the foot. The base of the interfemoral membrane, a little further back than a line joining the knee-joints, is covered, the remainder naked. Beneath, the wing-membrane is clothed as far as a line drawn from the elbow to the knee-joint, and half the interfemoral membrane has a few thinly spread hairs scattered over its surface.

The first and second upper premolars are very small, and (in the type specimens) not distinguishable without the aid of a lens.

The second upper premolar is but slightly internal to the first; in

the lower jaw both premolars stand in the tooth-row. Lower canine very small, not equal to the first molar in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 1″·75, tail 1″·45, head 0″·6, ear 0″·6, tragus 0″·3, forearm 1″·45, second finger 2″·3, fourth finger 1″·85, thumb 0″·3, tibia 0″·6, foot and claws 0″·4.

Hab. Caves of Bhima Devi, Kashmir (elevation about 6000 feet), where the type specimens were obtained by Captain W. G. Murray, who subsequently presented them to the Indian Museum.

To this subgenus also belongs *V. daubentonii*, which is very generally distributed throughout Europe, from Ireland to the Ural, and will probably hereafter be recorded from Asia. I therefore give a full description of it in the footnote below *.

7. Vespertilio davidii.

Vespertilio davidii, *Peters, MB. Akad. Berl.* 1869, p. 402.

Muzzle and ears as in *V. daubentonii*; laid forwards the extremity of the ear extends exactly to the end of the muzzle; the outer margin of the ear-conch terminates in a small distinct round lobe. Tragus long, subacute, attenuated in upper third; inner margin straight, lower two thirds of outer margin convex, upper one third straight; a distinct lobule at the base.

Wings to the base of the toes; feet rather large; toes nearly equal in length; last two caudal vertebræ free; the calcaneum extends somewhat more than half the distance between the ankle and the tail.

* VESPERTILIO DAUBENTONII.

Vespertilio daubentonii, *Leisler, Kuhl, Deutsch. Flederm.* p. 51.
Vespertilio volgensis, *Eversmann, Bullet. de Moscou*, i. p. 24 (1840).

Head very slightly raised above the face-line; ears moderately long, laid forwards the tips extend quite to the extremity of the muzzle, the inner margin forms a regular arc of a circle from the base to the tip; the tip is shortly rounded off; and the upper third of the outer margin is flat or concave, owing to the abrupt convexity of the succeeding middle third; tragus about half the length of the ear, the extremity straight, not curved outwards; the inner margin is straight, the outer has a very distinct triangular, rounded lobe at the base, then becomes regularly slightly convex upwards, reaching its greatest width about the middle, and terminating in an acute point.

Wings from the tarsus close to the base of the toes; calcaneum extending more than three fourths the distance between the ankle and the tail.

The face is sparingly covered with hair in front of the ears. The small labial glands are thinly clothed by some long straight hairs. On the dorsal surface the base of the interfemoral membrane as far as a line drawn between the centres of the tibia is covered; the tibiæ and the remaining part of the interfemoral naked.

Above the hairs are dark at the base, with reddish brown extremities; beneath similar at the base, but the extremities of the hairs are white.

The upper incisors are equal in size, and have strongly diverging cusps; the second upper premolar stands in the tooth-row, is very small, not one third the size of the first premolar, and its summit very slightly exceeds the cingulum of the first molar.

Hab. Generally distributed throughout Europe, from the Ural Mountains to Ireland, from Finland to Sicily.

Fur above dark, with light-brown tips; beneath similar, with gray or ashy extremities. Above and beneath the wing- and interfemoral membranes are covered along the sides of the body only.

The second upper premolar is very small, and placed internally in the angle between the closely approximated first and third premolars; in the lower jaw the second premolar is also very small and internal, but the first and third premolars are separated by a small interval.

This species is very like *V. daubentonii*; but the outer margin of the ear is less concave in its upper half, and the lower half is less convex; it is also distinguished by the position of the second premolar (which, as described above, is internal to the tooth-row in both jaws) and by the projecting caudal vertebræ.

Length, head and body 1″·7, tail 1″·3, head 0″·58, ear 0″·56 × 0″·3, tragus 0″·28, forearm 1″·25, thumb 0″·28, second finger 1″·7, fourth finger 1″·4, tibia 0″·5, calcaneum 0″·58, foot and claws 0″·33.

Hab. Pekin, China.

Type in the collection of the Paris Museum.

Subgenus 2. VESPERTILIO.

Feet moderate; wing-membrane from the base of the toes, rarely from the metatarsus; interfemoral membrane forming an obtuse angle in the centre of its free margin behind; tail wholly contained in the membrane, or projecting by its extreme tip only; calcaneum extending about halfway between the ankle and tail.

8. Vespertilio mystacinus.

Vespertilio mystacinus, *Leisler, Kuhl, Deutsch. Flederm. Ann. Wetterau. Naturk.* iv. p. 55 (1819); *Desmarest, Mammalogie*, p. 140 (1820); *Bell, Brit. Quadrup.* p. 50 (1837), wdct.; *MacGillivray, Brit. Quadrup. (Nat. Libr.)* pp. 63, 90 (1838); *Temminck, Monogr. Mammal.* ii. p. 191 (1835–41); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 310; *Wagner, Suppl. Schreb. Säugeth.* v. p. 725 (1855); *Blasius, Fauna Deutschl.* p. 96 (1857).

Vespertilio siligorensis, *Hodgson, Horsfield, Ann. & Mag. Nat. Hist.* 1853, p. 102.

Muzzle narrow; skull vaulted, not much elevated above the face-line; glandular prominences on the face small. Ears as long as the head; laid forwards the tips extend slightly beyond the end of the nose; internal basal lobe angular, the horizontal margin forming, with the ascending anterior margin, a right angle; lower third of inner margin of the conch faintly convex, middle third more strongly convex, upper third straight, tip rounded off; upper third of the outer margin deeply concave, lower half abruptly convex, with a distinct lobe at the base, separated by a slight emargination opposite the base of the tragus. Tragus narrowed above and subacutely pointed; inner margin straight or faintly concave; outer margin with a distinct rounded half-horizontal lobule at the base, succeeded by a concavity, above which and slightly above the base of the inner

margin the tragus reaches its greatest width, thence upwards decreasingly convex to the tip.

Wings from the base of the toes; calcaneum terminating in a small projecting tooth; last rudimentary caudal vertebra free.

Fur, above, dark brown, with reddish brown tips; beneath, dark brown, the extremities of the hairs slightly ashy.

The small glandular prominences of the face are clothed with long hairs; and the upper lip has a fringe of fine straight hairs.

The fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the middle of the femur, and upon the interfemoral membrane as far as the end of the third caudal vertebra; beneath, the distribution of hair upon the wings is similar, but the interfemoral is covered only at the root of the tail.

The upper incisors are equal in vertical extent, their extremities strongly diverging. Both upper premolars are drawn inwards; the second very small, about half the size of the first, and about half its vertical extent; lower incisors next the canines much larger than the others.

Length, head and body 1″·5, tail 1″·4, head 0″·55, ear 0″·55, tragus 0″·3, forearm 1″·25, thumb 0″·25, second finger 2″·1, fourth finger 1″·6, tibia 0″·55, foot and claws 0″·28.

Some specimens give somewhat larger measurements than these.

Hab. Himalayas (Nipal), probably extending throughout the whole range. In Europe extending from Russia to Ireland, and from the Alps to Finland (Blasius).

9. Vespertilio muricola.

Vespertilio adversus, *Temminck* (*non Horsfield*), *Monogr. Mammal.* ii. p. 221; *Peters, MB. Akad. Berl.* 1866, p. 399; 1868, p. 626.

? Vespertilio tralatitius, *Temm.* (*non Horsf.*) *l. c.* p. 228.

Vespertilio muricola, *Hodgson, J. A. S. B.* x. p. 908; *Gray, Cat. Mamm. Brit. Mus.* 1843, p. 26; *id. List of Mammalia and Birds of Nepaul presented by B. H. Hodgson, Esq., to the British Museum,* 1846.

Kerivoula trilatitoides, *Gray, Cat. Mamm. Brit. Mus.* 1843, p. 27 (*nomen nudum*) (*vide Peters, MB. Akad. Berl.* 1866, p. 399).

Vespertilio caliginosus, *Tomes, P. Z. S.* 1859, p. 73.

Vespertilio ater, *Bernstein, Peters, l. c.* 1866, p. 18.

Vespertilio (Pternopterus) lobipes, *Peters, l. c.* 1867, p. 706.

Vespertilio blanfordi, *Dobson. P. A. S. B.* 1871, p. 214.

Vespertilio moupinensis, *Alph. Milne-Edwards, Mammif. du Tibet,* p. 255, pl. xxxvii^a. fig. 2, pl. xxxvii^c. fig. 4 (1872).

Muzzle very similar to that of *V. mystacinus* in shape, but more obtuse in front, owing to the greater development of the glands of the muzzle, which are also less covered with hair; the outer margin of the ear is deeply concave beneath the tip, but the emargination does not extend so far down as in that species. Laid forwards the extremities of the ears scarcely extend beyond the end of the muzzle; internal basal lobe of the ear-conch angular, the ascending anterior

margin straight immediately above the base, then faintly concave for a short distance, the middle third convex, the upper third straight, the tip narrowly round off; the outer margin deeply concave in the upper third, then abruptly convex, slightly emarginate opposite the base of the tragus, and terminating in a short, internally concave and marginally convex lobe. Tragus subacutely pointed; inner margin slightly concave, giving the tragus an inclination forwards and inwards; outer margin with a very distinct lobe at the base, succeeded by an angular emargination, above which the greatest breadth is soon attained, thence decreasingly convex to the tip.

Wings to the base of the toes: calcaneum with a narrow longitudinal postcalcaneal lobe; extreme tip of the tail alone projecting.

The distribution of the fur upon the wing-membranes is similar to that of *V. mystacinus*. On the lower surface of the interfemoral fine hairs arise from the transverse dotted lines on the greater part of its surface.

Above, black, the extreme tips of the hairs light yellowish brown; on the head and face black, with shining tips; beneath, black, with ashy extremities; specimens in colourless alcohol appear intensely black throughout.

The upper incisors on each side scarcely diverge so much as in *V. mystacinus*; the second shorter cusp of the inner incisor distinct, and placed rather near the base; second upper premolar slightly internal to the tooth-row, very small, and scarcely distinguishable without the aid of a lens.

The following Table exhibits measurements of this species from different localities. All the specimens measured appeared perfectly adult, and were preserved in alcohol.

	Length, head and body.	tail.	ear.	tragus.	forearm.	thumb.	second finger.	fourth finger.	tibia.	foot and claw.	Sex.
		"	"	"	"	"	"	"	"	"	
V. muricola. Java.....	1·6	1·3	0·5	0·25	1·3	0·23	2·4	1·8	0·62	0·26	♀♀♀
do. Singapore	1·7	1·6	0·52	0·23	1·35	0·22	2·5	1·8	0·62	0·25	♀♀♀
do. Borneo ...	1·65	1·65	0·5	0·22	1·35	0·22	2·55	1·8	0·6	0·25	♀
do. Arracan (Akyab) *	1·6	1·55	0·5	0·25	1·3	0·22	2·5	1·8	0·55	0·26	♂
V. muricola. Simla† ...	1·7	1·5	0·5	0·25	1·28	0·2	2·2	1·65	0·5	0·25	♀♀♀
do. Láchúng†	1·55	1·35	0·5	0·25	1·2	0·2	2·1	1·55	0·45	0·25	♂
do. Nipal(type)	1·75	1·5	0·55	0·25	1·35	0·23	2·25	1·7	0·6	0·3	♀♀♂
do. Amboyna‡	1·85	1·6	0·55	0·25	1·5	0·25	2·7	1·9	0·6	0·3	♀

* *Vespertilio lobipes*, Peters.

† *Vespertilio blanfordi*, Dobson. (The first with *fœtus in utero*.)

‡ *Vespertilio adversus*, var. *amboinensis*, Peters.

On comparing the above measurements, it may be seen that considerable difference in absolute size exists between specimens of this species from different localities; the relative lengths of the parts of the body, however, are nearly the same in all. I have most carefully compared, again and again, the specimens of which the above measurements are given, and I could not find any difference between them which might be depended upon as a specific character.

V. blanfordi and *V. amboinensis* appear to represent the extreme varieties of form in this species. In the former the convex lower two thirds of the outer margin of the ear reaches its greatest development, appearing like the large antitragus in most species of *Rhinolophus*, while the measurements are less than in any other form; in the latter the antitragus is moderately developed, the ears are comparatively longer, and the measurements greater than in any other form. Between these two forms, however, a great number of intermediate forms occur, which render it impossible, in my opinion, to regard them as distinct species.

V. muricola, then, may be distinguished from all other species of this division of the genus by the presence of a small but distinct postcalcaneal lobe, by the deep angular emargination of the upper third of the outer margin of the ear, by the intensely black colour of the fur and membranes, and by its small size.

Hab. Sumatra, Java, Borneo, Celebes, Amboyna (probably all the islands of the Malay archipelago north of the Austro-Malayan region); Siam, Malay peninsula, Arracan (Akyab); Himalaya (Sikhim, Láchúng, 8000 feet, Simla, Ḍalhousie); Tibet.

Fig. *a*.

Fig. *b*.

Fig. *c*.

10. Vespertilio montivagus.

Vespertilio montivagus, *Dobson, J. A. S. B.* 1874, pt. ii. p. 237.

Crown of the head very slightly elevated; muzzle obtuse. Ears narrow, tapering, with rounded tips; outer side flatly emarginate immediately beneath the tip for about quarter its length, then slightly convex, and, lower down, opposite the base of the tragus, with a small emargination, terminating beyond this in a small rounded lobe; inner margin convex for two thirds its length, then forming a straight line to the tip; tragus long, narrow, and acutely pointed; inner margin straight, outer slightly convex upwards, with a small rounded lobe at the base. (Figs. *a*, *b*, *c*.)

Feet very small; toes two thirds the length of the whole foot. Tail wholly contained within the interfemoral membrane. Wings from the base of the toes.

Fur, above, dark brown, the extreme tips paler and shining; beneath, much darker, almost black for three fourths the length of the hairs, the remaining portion ashy. In front the face is everywhere densely covered, the long hairs concealing the eyes and leaving the tip of the nose alone naked; on each side of the muzzle two or three small glandular wart-like elevations may be seen through the hairs. The ears are quite naked anteriorly, posteriorly their bases only are covered. On the wing-membrane the fur of the back extends as far as a line drawn from the junction of the proximal and middle thirds of the humerus to the commencement of the distal third of the femur; on the interfemoral membrane it ceases abruptly at the end of the second caudal vertebra. Beneath the fur extends upon the wing-membrane as far as a line drawn from the elbow to the knee-joint; the interfemoral membrane is covered at the root of the tail, and three fourths of the remaining part is very thinly clothed with the short hairs arising from the transverse dotted lines.

Incisors on each side parallel and acutely pointed; inner incisors longest, with a small acutely pointed talon near their extremities on the outer side. In the lower jaw the second premolar is small but distinctly visible, standing in the tooth-row; in the upper jaw the space between the canine and third premolar is small, and the second premolar is very minute, placed interiorly, in the angle between the first and third premolar, and with difficulty distinguishable even with the aid of a lens.

Length, head and body 1″·8, tail 1″·6, head 0″·65, ear 0″·58, tragus 0″·25, forearm 1″·5, thumb 0″·25, second finger 2″·7, fourth finger 1″·9, tibia 0″·6, foot and claws 0″·3.

Hab. Hotha, Yunan.

The above description is taken from adult male and female specimens preserved in alcohol, obtained by Dr. J. Anderson during the Yunan Expedition, and deposited in the Indian Museum, Calcutta.

11. Vespertilio murinus.

Vespertilio murinus, *Schreber, Säugeth.* i. p. 165.
Vespertilio myotis, *Bechstein, Natury. Deutschl.* p. 1154; *Kuhl, Deutschl. Flederm. Ann. Wetter. Naturk.* p. 36 (1819).
Vespertilio blythii, *Tomes, P. Z. S.* 1857, p. 53.

Head slightly elevated above the face-line; muzzle conical; nostrils close together in front; ears large, laid forwards the tips extend about one tenth of an inch beyond the end of the muzzle; horizontal basal lobe angular in front, the horizontal margin joining the ascending part of the inner margin under a right angle; the lower fourth of the inner margin is straight, the remaining portion regularly convex to the tip, which is rounded off; outer margin concave beneath the tip, straight or faintly convex about the

middle, emarginate opposite the base of the tragus, terminating in a convex lobe opposite the base of the inner margin (see p. 139, fig. *b*); tragus long, narrow, and subacutely pointed; inner margin straight, outer margin with an obliquely placed rounded lobe at the base, above which it becomes convex, and the tragus reaches its greatest width opposite the junction of the lower and middle thirds of its inner margin, the convexity of the outer margin rapidly lessening upwards, so that it is straight in its upper half, not curved outwards.

Wings from the metatarsus near the base of the toes; tail wholly contained, except the last rudimentary vertebra, within the interfemoral membrane.

Fur, above, light reddish or smoke-brown; beneath, dirty white, the base of the hairs, above and beneath, dark.

The second upper premolar is scarcely half the first, both in vertical extent and in cross section; it is generally much pressed inwards in the angle between the first and third premolars.

Length (of an adult ♀ preserved in alcohol), head and body 2″·8, tail 2″·1, head 1″, ear 1″·1, tragus 0″·45, forearm 2″·35, thumb 0″·5, second finger 3″·9, fourth finger 3″, tibia 1″, foot and claws 0″·5.

Hab. N.W. Himalaya, Syria, Middle and Southern Europe, extending also into England; Northern Africa.

I have examined the type of *Vespertilio blythii*, Tomes, in the British Museum, and have no hesitation in referring it to this species. The drying-process has caused the wing-membrane to shrink so much that the wings appear to arise from the ankles instead of from the metatarsus*.

12. Vespertilio murinoides.

Vespertilio murinoides, *Dobson, J. A. S. B.* xlii. pt. ii. p. 205, pl. xiv. (1873).

General form of the ear triangular, with narrow rounded tips;

* VESPERTILIO BECHSTEINII.

Vespertilio bechsteinii, *Leisler in Kuhl, Deutsch. Fledermäuse, Annal. Wetter. Gesellsch. Naturk.* Bd. i. p. 30 (1819); *Temm. Monogr. Mammal.* ii. p. 184 (1835–41); *Bell, Brit. Quadrup.* p. 40 (1837); *Wagner, Suppl. Schreb. Saugeth.* v. p. 723 (1855); *Blasius, Fauna Deutschl.* p. 85 (1857).

This species resembles *V. murinus*; but the ear is much longer than the head, and the tragus distinctly concave in the upper half of its outer margin and curved outwards. The outer margin of the ear-conch is very slightly flattened beneath the tip, the remaining portion, as far as the base of the tragus, convex, then slightly emarginate, and terminating in a convex lobe.

Wings from the base of the toes; the last rudimentary caudal vertebra free.

Fur, above and beneath, dark brown at the base; the extremities of the hairs above light reddish, beneath white. Distribution of the fur as in *V. murinus*.

Length (of an adult specimen), head and body 2″, tail 1″·5, head 0″·75, ear 0″·95, tragus 0″·48, forearm 1″·55, second finger 2″·7, fourth finger 2″·1, tibia 0″·8, foot and claws 0″·35.

Hab. Middle Europe, extending from the Ukrain to Southern England.

This species, though generally resembling *V. murinus*, is readily distinguished by the proportionally much longer ears, by the form of the tragus, by the wing-membrane extending quite to the base of the toes, and also by its considerably smaller size.

the inner margin very faintly convex, almost straight in its upper third; the outer margin concave beneath the tip, the remaining portion convex, with a faint concavity opposite the base of the tragus (fig. *a*).

Fig. *a*.

Fig. *b*.

In *Vespertilio murinus* the inner margin of the ear is strongly convex from the base to the tip, the concavity of the outer margin beneath the tip is very feeble, and there is a distinct emargination, almost angular, opposite the base of the tragus, succeeded by a well-developed terminal lobe; the general form of the ear, moreover, is oval, not triangular (fig. *b*).

The tragus is slender and acutely pointed, with a quadrangular lobe at the base of the outer margin. In *V. murinus* the tragus is subacutely pointed, and the lobe at its base is remarkably small.

Fur dark brown above, with light-brown tips; beneath, dark brown, almost black, with grayish tips.

The first upper premolar is very small, scarcely visible from without, and not much larger than the second. In *V. murinus* this tooth is distinctly visible from without, and is much larger than the second premolar.

Length (of an adult ♀ preserved in alcohol), head and body 2″·5, tail 2″·1, head 0″·9, ear 0″·85, tragus 0″·4, forearm 2″·1, thumb 0″4, second finger 3″·4, fourth finger 2″·8, tibia 0″·9, calcaneum 0″·9, foot and claws 0″·5.

Hab. N.W. Himalaya (Chamba), at an elevation of 3000 feet.

Type in the collection of the Indian Museum, Calcutta.

13. Vespertilio chinensis.

Vespertilio chinensis, *Tomes, P. Z. S.* 1857, p. 52.

Muzzle long; nostrils prominent, opening sublaterally; crown of the head very slightly raised above the face-line; ears narrow, tapering, tip narrowly rounded off; outer margin straight above, faintly convex opposite the middle of the tragus and thence downwards to its termination; tragus attenuated towards the tip, inner margin straight, outer slightly convex below, straight above, attaining its greatest convexity slightly below the middle of the inner margin.

Fur dark brown above, the extreme tips paler; beneath similar,

but with paler greyish brown tips on the chest and abdomen, darker along the sides of the body.

In the single type specimen the upper inner incisors are peculiarly shaped; they are shorter than the outer incisors, thick and blunt, with a blunt external cusp; the outer incisors longer and curved slightly outwards. The first upper premolar acutely pointed, the second internal to it and the third premolar. The premolar and molar series in both jaws very similar to that of *V. murinus*.

Length, head and body about 3″·7, tail about 2″·1, head 1″, ear 0″·7, tragus 0″·3, forearm 2″·5, thumb 0″·5, second finger 4″, fourth finger 2″·2, tibia 1″, foot and claws 0″·55.

This is the largest species of *Vespertilio* yet discovered.

Hab. China.

Type in the collection of the British Museum.

14. Vespertilio formosus.

Vespertilio formosus, *Hodgson, J. A. S. B.* iv. p. 700 (1835); *P. Z. S.* 1836, p. 46; *Wagner, Suppl. Schreb. Säugeth.* v. p. 736 (1855); *Tomes, P. Z. S.* 1858, p. 82.

Kerivoula formosa, *Gray, List of Mammals in Coll. Brit. Mus.* p. 27 (1843).

Vespertilio rufo-pictus, *Waterhouse, Ann. & M. N. H.* xvi. p. 54 (1845); *Tomes, P. Z. S.* 1858, p. 85.

Vespertilio (Kerivoula) formosa, *Horsfield, Cat. Mammal. Mus. E. I. Comp.* p. 41 (1851).

Kerivoula pallida, *Blyth, Cat. Mamm. Mus. As. Soc. Beng.* p. 34 (1863).

Vespertilio auratus, *Dobson, J. A. S. B.* xl. p. 186, pl. x. (1871).

Head very slightly elevated above the face-line; muzzle conical, not concave between the crown of the head and anterior extremities of the nasal bones; extremity of the nose projecting slightly beyond the upper lip, with a very shallow concavity between the nostrils, which open sublaterally. Ears ovate, with rounded tips directed outwards; the outer margin is abruptly and irregularly concave beneath the tip for about one third its length, then gradually convex and terminating opposite the basal lobe of the inner margin in a small lobe; tragus long, narrow, and obtusely pointed; inner margin straight, outer margin curved outwards at the base for about one third of its length, then ascending straight, equally inclined to the inner margin; on the curve at the base a very small lobule is placed obliquely.

Wing-membrane very broad, attached to the base of the toes, remarkably variegated with orange and rich brown-black. The portions of dark-coloured membrane are triangular in form, and occupy the spaces between the second and third and third and fourth fingers, and also the space included between the fourth finger and a line drawn between the carpus and the ankle. All the remaining portions of membrane, including the ears and interfemoral membrane, are orange. The orange-colour extends in narrow lines along each side of the fingers (the bones of which are of the same

hue), and is dispersed over the dark triangular spaces in dots and streaks.

The fur of the head extends upon the face, forming a fringe along the margin of the upper lip; from the back it extends upon the humerus and antehumeral membrane, covering half the extent of the latter; on the wing-membrane it is confined to a narrow space along the sides of the body and terminates rather abruptly; behind, it passes on to the interfemoral membrane, covering nearly half its surface, and, leaving the posterior half of the interfemoral and calcanea bare, reappears on the back of the toes. Beneath, the fur of the thorax extends along the humerus to the elbow-joint, and as far as a line drawn from the elbow to the knee-joint the wing-membrane is covered with a few scattered hairs; behind, the fur of the abdomen extends upon the interfemoral membrane, rather densely at the root of the tail, but quickly thins out into a few very short scattered hairs, which extend over half its surface.

Dentition quite similar to that of *V. murinus*; the second upper premolar very small, and in many specimens difficult to distinguish even with the aid of a lens.

Length (of an adult ♀ preserved in alcohol), head and body 2″·4, tail 1″·9, head 0″·8, ear 0″·7, tragus 0″·35, forearm 1″·9, second finger 3″·3, fourth finger 2″·9; thumb 0″·45, tibia 0″·9, foot and claws 0″·4.

Hab. Himalaya (Nipal, Darjiling); Khasia hills; China (Shanghai, Kiang, Amoy).

Fig. *a*.

15. Vespertilio nipalensis.

Vespertilio nipalensis, *Dobson, P. A. S. B.* 1871, p. 214.

Crown of the head almost level with the face-line; muzzle narrow, appearing somewhat broader near its extremity owing to the small glandular prominences between the eyes and nostrils; nostrils opening sublaterally without intervening emargination. Ears mode-

Fig. *b*.

rately long, narrow, and pointed; outer margin of the ear-conch deeply hollowed out immediately beneath the tip, which projects outwards

considerably; the lower half of the outer margin is slightly convex, and terminates a short distance in front of the base of the tragus, not forming any lobe or anterior projection; tragus long, narrow, and pointed, curved slightly outwards; at the base, on the outer margin, a small lobule is placed, which in this species appears unusually long.

Wing-membrane from the base of the toes; toes long, about two thirds the length of the whole foot.

The fur of the head and back is long and dense, bicoloured, from the base upwards black with brown tips; beneath, the hairs are black for two thirds their length, the remaining portion to the tip *pure white*. The whole under surface of specimens dried from spirit appears white, and the dark portions of the hairs are not perceived till the fur is raised. Between the eyes, and as far as the slight glandular prominences of the muzzle, the face is covered with very long dense fur of the same quality as that on the back of the head; in front of the base of the ear and about the eye the fur is very short and thin; and the same kind of fur also clothes the glandular prominences, interspersed with long straight hairs. On the upper surface the wing-membranes are clothed along the sides of the body only; beneath they are covered as far as a line drawn between the middle of the humerus and femur; behind about half the upper surface of the interfemoral membrane is clothed with a few short thinly spread hairs; the under surface is similarly covered, but the hairs extend further back along the tail.

The canines in both jaws are very short, in the lower jaw resembling premolars; the first and second premolars are minute, and in the upper jaw scarcely distinguishable without the aid of a lens.

Length (of an adult ♀ preserved in alcohol), head and body 1″·65, tail 1″·35, head 0″·6, ear 0·″48, tragus 0″·25, forearm 1″·35, thumb 0″·25, tibia 0″·6, calcaneum 0″·6, foot and claws 0″·3.

Hab. Katmandu, Nipal. (Type in the Indian Museum.)

16. Vespertilio emarginatus.

Vespertilio emarginatus, *Geoffroy, Ann. du Muséum*, vol. viii. p. 198; *Desmar. Mammal.* p. 140 (1820); *Bonap. Faun. Ital.* (1832–42); *De Selys-Longchamps, Faune Belge* (1842).
Vespertilio mystacinus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 310.
Vespertilio ciliatus, *Blasius, Wiegm. Archiv*, 1853, p. 288; *Fauna Deutschl.* p. 91 (1857).

Crown of the head very slightly raised above the face-line; muzzle long, sloping evenly downwards on the sides to the margin of the upper lip; extremity of nose projecting slightly. Ears nearly as long as the head; laid forwards the tips extend to the end of the nose; the horizontal margin of the internal basal lobe forms a right angle with the ascending margin, which in its lower fourth is straight, and then slightly convex to the tip; the tip is shortly rounded off; beneath it the upper third of the outer margin is deeply emarginate (but the tip scarcely projects outwards), then very

abruptly convex, and terminating in a small lobe curved inwards. Tragus long, narrow above and acutely pointed, reaching nearly to the edge of the emarginate portion of the outer margin of the conch; the inner margin slightly convex; the outer margin convex below, with a small lobe at the base, concave above, so that the tragus is directed outwards.

Wings to the base of the claws; extreme tip of the tail free.

On the upper surface the fur of the body extends thinly upon the wing-membranes as far as a line drawn from the middle of the humerus to the knee-joint; upon the interfemoral as far as a line drawn from one tibia to the other; also upon the legs as far as the ankles, and upon the toes very sparingly; the posterior margin of the interfemoral is fringed by a few short fine hairs. Beneath, the wing-membrane is covered with very few fine hairs ranged along the transverse lines as far as a line drawn from the elbow to the knee, and the interfemoral has a patch of thinly spread hairs about the root of the tail. The face is rather thickly covered with short hairs, the margin of the upper lip is fringed with long hairs, and the chin is similarly covered; the ear-conch is clothed internally with short hairs arising from papillæ as in *Kerivoula*; but the integument of the ears is rather thicker than in the species of that genus.

Fur, above, dark brown at the base, then light brown with reddish brown tips; beneath, similar, with much lighter-coloured extremities. Ears and membranes reddish brown.

The first upper premolar stands in the tooth-row, is about half the vertical height of the third premolar, and the bases of these teeth nearly touch; the second premolar is very small, not one third the the size of the first premolar, and is crushed inwards; the first lower premolar is somewhat more than half the vertical height of the canine; the second premolar is scarcely two thirds the size of the first; and the third premolar exceeds the first molar in vertical extent.

Length (of an adult ♀ preserved in spirit), head and body 1″·75, tail 1″·65, head 0″·75, ear 0″·75, tragus 0″·35, forearm 1″·58, thumb 0″·35, second finger 2″·55, third finger 2″·1, fourth finger 2″·1, tibia 0″·75, foot and claws 0″·38*.

* VESPERTILIO NATTERERI.

Vespertilio nattereri, *Kuhl, Deutsch. Fledermause, Annal. Wetter. Gesellsch. Naturk.* Bd. i. p. 33 (1819); *Temm. Monogr. Mamm.* ii. p. 185; *Bell, Brit. Quadrup.* p. 42 (1837); *Wagner, Suppl. Schreb. Säugeth.* v. p. 723 (1855); *Blasius, Fauna Deutschl.* p. 88 (1857).

Head considerably raised above the face-line; muzzle broad, sides not prominent, evenly sloping down to the edge of the upper lip. Ears long, laid forwards they extend at least one tenth of an inch beyond the end of the nose; in general shape oval, with evenly rounded extremities, the convexity of the ear interrupted in the upper third of the outer margin only by slight flattening; the inner margin is regularly convex from the base to the tip; near the termination of the outer margin a small vertically placed outer lobe (the antitragus) is well marked in this species. The tragus is very long, quite three fourths the diameter of the ear-conch, narrow and subacutely pointed, the inner margin slightly convex, the outer correspondingly concave; at the base of the outer margin a distinct hori-

Subsp. *a*. Vespertilio desertorum.

Vespertilio desertorum, *Dobson, Blanford, Ann. & M. N. H.* Nov. 1875.

Similar to *V. emarginatus* in structure, but distinguished by its greater size, much lighter colour of the fur and membranes, and especially by the upper incisors, which are parallel and close together.

Calcaneum distinct, terminating in a well-marked small projecting lappet of skin; ears very thin; glandular papillæ distinct.

Fur, above and beneath, very light-coloured; ears and interfemoral membranes pale yellowish white; wing-membranes dusky white.

The fur on the back is tricoloured, dark at the base, then pale straw-coloured, the extremities very light reddish brown; beneath, dark at the base of the hairs, the extremities very pale straw-colour.

Length (of an adult ♀ preserved in spirit), head and body 2″·1, head 0″·75, tail 1″·6, ear 0″·65, tragus 0″·35, forearm 1″·75, thumb 0″·35, second finger 2″·8, third finger 2″·25, fourth finger 2″·35, tibia 0″·8, calcaneum 0″·55, foot and claws 0″·4.

Hab. Baluchistan. (Type in the British Museum.)

This appears to be the representative of *V. emarginatus* in Baluchistan and surrounding countries. The above-described well marked characters (derived from an examination of several specimens preserved in alcohol), though apparently constant, do not, in my opinion, justify complete separation as a species distinct from the European form.

17. Vespertilio fimbriatus.

Vespertilio fimbriatus, *Peters, P. Z. S.* 1870, p. 617. no. 2.
Vespertilio laniger, *Peters, l. c.* no. 3.

Ears long and remarkably narrow, the upper half triangular; outer margin concave in upper half, convex below, terminating opposite

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zontal lobe succeeded by an emargination, immediately above which, opposite the base of the inner margin, the tragus suddenly attains its greatest width.

Wings from the base of the toes or close to them; calcaneum long; tip of tail projecting; the portion of membrane between the end of the calcaneum and the tail is fringed with short stiff hairs. This fringe of hairs readily distinguishes the species. Fur very long and dense; above, dark brown, with reddish brown tips; beneath, darker at the base, the terminal third of the hairs white.

First and second premolars small, the second about half the first in vertical extent, but scarcely one third its bulk and slightly internal to it. In the lower jaw the second premolar is very slender, about half the height of the first premolar, and, though standing in the tooth-row, placed in a plane distinctly internal to the first premolar, which slants slightly outwards.

Length (of an adult ♀ preserved in alcohol), head and body 1″·65, tail 1″·65, head 0″·65, ear 0″·7, tragus 0″·4, forearm 1″·45, thumb 0″·3, second finger 2″·6, fourth finger 1″·9, tibia 0″·6, calcaneum 0″·85, foot and claws 0″·35.

Hab. Middle Europe, from the Ural Mountains to Ireland.

This species appears to connect the genera *Vespertilio* and *Kerivoula*, agreeing with the species of the former genus in dentition, and, slightly, in the form of the ears; while the form of the head, the semitransparent ears marked with glandular papillæ, the great length of the tail, the long calcanea curved backwards, and fringed interfemoral membrane connect it closely with the species of *Kerivoula*.

the base of the tragus without forming a lobe; tragus about half the length of the inner margin of the ear, narrow and acutely pointed, outer margin convex immediately above the base, then concave, inner margin correspondingly convex. Face narrow and densely clothed with woolly hair. Wings from the metatarsus; feet rather large; tail (in the type specimen, a dried skin) wholly included within the interfemoral membrane.

Fur, above, black with brown tips; beneath, black with ashy tips. On the upper surface the fur extends to the membranes along the sides of the body only; beneath, a few fine hairs cover the wing-membrane as far as a line drawn from the elbow to the knee-joint; the interfemoral membrane is nearly naked, except where a few fine thinly spread hairs fringe the posterior free margin.

The canine and third premolar are rather close, so that the small first and second premolars are drawn inwards, the second more than the first.

Length (of the type specimen, a dried skin), head and body about 1″·6, tail about 1″, ear 0″·6, tragus 0″·28, forearm 1″·5, thumb 0″·3, second finger 2″·6, fourth finger 2″, tibia 0″·6, foot and claws 0″·4.

Hab. China (Amoy).

Type in the collection of the British Museum.

Prof. Peters, in describing this species, remarks:—"Closely allied to *V. emarginatus*, Geoff.; ears rather more emarginate and more pointed, tragus straight and shorter."

From the bad condition of the specimens representing this species, I really find it difficult to determine its position. The large size of the feet appear to indicate its position among the species of the subgenus *Leuconoë*, while the apparent shortness of the tail, which seems to be almost wholly included within the interfemoral membrane, renders this doubtful. I place it, therefore, provisionally next *V. emarginatus*.

KERIVOULA.

Kerivoula, *Gray, Ann. & Mag. Nat. Hist.* vol. x. p. 258 (1842); *Tomes, P. Z. S.* 1858, p. 322.

Muzzle narrow, elongated; skull very concave between the nasal bones and the vertex, so that the crown of the head appears considerably vaulted; glandular prominences between the eyes and nostrils very small, indistinct, the upper surface of the muzzle sloping down evenly, laterally and in front, to the margin of the lip; aperture of nostril completely circular, opening sublaterally close to the margin of the upper lip; mouth wide, upper and lower lips projecting slightly, the upper lip and the angle of the mouth thickly fringed with long hairs: ears funnel-shaped owing to the great convexity of their outer margins, diaphanous, studded with glandular papillæ from which minute hairs arise; the outer margin terminating very abruptly by a deep lobe not separated from the outer side of the ear, and not carried forwards to the angle of the mouth; tragus extremely long and narrow and very acutely pointed, straight

or slightly curved outwards: integumentary system largely developed; wings very wide; anterior margin of the deep antebrachial membrane free throughout; calcaneum long and strong, *curved backwards*, no postcalcaneal lobe; posterior margin of the interfemoral membrane fringed with short straight hairs; tail longer than the head and body, wholly contained within the interfemoral membrane.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$.

Second upper premolar smaller than the third, but not minute as in *Vespertilio*; second lower premolar equal to or slightly larger than the first, and nearly or quite equal to the third.

This genus includes some of the most delicately formed and most truly insectivorous, tropical, forest-haunting Bats. They are distinguished from *Vespertilio* (with which they agree in the number of the teeth) not by any single character, but by a series of characters in which they closely resemble each other and differ from all other forms.

1. Kerivoula picta.

Vespertilio pictum, *Pallas, Spicil. Zoolog.* fasc. iii. p. 7.

Vespertilio pictus, *Schreb. Säugeth.* i. p. 170 (1775); *Gmel. Linn. Syst. Natur.* p. 49 (1788); *Geoffroy, Ann. du Mus.* viii. p. 199 (1806); *Desmarest, Mammalogie*, p. 141 (1820); *Horsf. Zool. Research. Java* (1825); *Temm. Monog. Mammal.* ii. p. 223 (1835–41); *Wagner, Schreb. Säugeth. Suppl.* v. p. 736.

Vespertilio kirivoula, *F. Cuvier, Nouv. Annal. du Muséum*, t. i. p. 9 (1832).

Kerivoula picta, *Gray, Ann. & Mag. Nat. Hist.* x. p. 258 (1842); *Kelaart, Prodr. Fauna Zeylanica*, p. 25 (1852); *Tomes, P. Z. S.* 1858, p. 325.

Vespertilio (Kirivoula) pictus, *Horsfield, Cat. Mammal. Mus. E.I. Comp.* p. 40 (1851).

Ears moderate; laid forwards the tips reach midway between the eyes and the end of the muzzle; inner side very convex forwards; the lower half of the inner margin sloping forwards and upwards so as to overhang the eye, the upper half upwards and backwards to the tip, which is short and subacute; immediately beneath the tip the outer margin is shortly but deeply concave, the remaining four fifths of the outer side of the conch much expanded outwards and forwards, and terminating abruptly midway between the base of the tragus and the angle of the mouth by a sudden inward curvature of the outer margin. Tragus very long and straight, extending almost as high as the base of the emargination on the outer side of the ear beneath the tip; inner margin straight; no lobe at base of outer margin, but a distinct tooth-like projection opposite the base of the inner margin, from which the outer margin slopes straight upwards to the very acute tip.

Thumb short; wings to the base of the toes. Fur, above, deep orange; beneath, paler. The ears, antebrachial, and interfemoral membranes of the same deep orange colour; the wing-membrane between the humerus and the posterior limb, the free margin of the membrane between the foot and the fourth finger, along the

posterior side of the forearm, and on both sides of each finger, deep orange; the remaining parts deep black with scattered orange dots, especially on the membrane between the metacarpal bones of the second and third fingers. Both the inner and outer surfaces of the ear-conch are thickly covered with small papillæ from which fine hairs arise. A dense tuft of long hairs springs from the angle of the mouth, and extends half the length of the upper lip; face naked directly in front of the eyes and for a space around the eyes. On the upper surface the wing-membrane is thinly covered with long hairs as far as a line drawn from the middle of the humerus to the knee-joint; the same kind of hairs extend upon the thighs and tibiæ and cover the interfemoral thinly as far as a line drawn between the ankles; the backs of the feet to the base of the claws are densely covered with short fine orange-coloured fur, which also forms a thick short fringe along the posterior margin of the calcanea and interfemoral membrane.

Inner upper incisors long, in vertical extent nearly equal to three fourths of the canine, acutely pointed, a small second cusp posteriorly near the base; outer incisor short, unicuspidate, slanting slightly inwards towards the posterior cusp of the inner incisor, which it nearly or quite equals in vertical extent. First and second upper premolars distinct, the second slightly internal and separated from the third by a small space. Lower incisors not crowded, distinctly trifid. Lower premolars nearly equal in size.

Length, head and body 1″·55, tail 1″·6, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·4, thumb 0″·22, second finger 2″·9, fourth finger 2″·1, tibia 0″·55, foot and claws 0″·3.

Hab. Peninsula of India; Ceylon; Burma; Sumatra; Java. Probably distributed generally throughout the tropical regions of the Asiatic continent.

The very peculiar markings of the membranes of this Bat, of *Vespertilio formosus* (*antea*, p. 140), and of *V. welwitschii*, Gray, from S.W. Africa, are on the same plan, and appear to be the result of "protective mimicry," the colours being arranged so as to resemble the leaves or the fruits of the trees in which these Bats take up their abode. Of one of the two first-named species, probably, Mr. Swinhoe remarks:—"A species of *Keriwoula*, allied to *K. picta* and *K. formosa*, was brought to me by a native. The body of this Bat was of an orange-brown; but the wings were painted with orange-yellow and black. It was caught, suspended head downwards, on a cluster of the round fruit of the Longan tree (*Nephelium longanum*). Now this tree is an evergreen; and all the year through some portion of its foliage is undergoing decay, the particular leaves being, in such a stage, partially orange and black. This Bat can therefore at all seasons suspend from its branches, and elude its enemies by its resemblance to the leaf of the tree. It was in August when this specimen was brought to me. It had at that season found the fruit ripe and reddish yellow, and had tried to escape observation in the semblance of its own tints to those of the fruit"*.

* P. Z. S. 1862, p. 357.

Fig. *a*.

Fig. *b*.

Fig. *c*.

2. Kerivoula hardwickii.

Vespertilio hardwickii, *Horsfield, Zool. Researches in Java* (1825); *Temm. Monogr. Mammal.* ii. p. 222 (1841); *Wagner, Suppl. Schreb. Säugeth.* v. p. 736 (1855).
Kerivoula hardwickii, *Gray, A. & M. N. H.* x. p. 258 (1842).
Kerivoula fusca, *Dobson, P. A. S. B.* 1871, p. 215.

About the same size as *K. picta*, from which it is at once distinguished by the uniform colour of the fur and membranes. Ears larger than those of that species; laid forwards the tips extend nearly to the end of the muzzle; the inner margin forms almost a regular arc of a small circle from the base to the tip; the tips are rounded, and immediately beneath there is a short but deep concavity occupying the upper fourth of the outer margin; below this the outer side of the conch becomes much expanded, and projects forwards anteriorly even more than in *K. picta*, the outer margin curving inwards and backwards towards the base of the tragus to its termination. Tragus very long (extending in some specimens quite to the edge of the emargination below the tip on the outer side of the ear) and much attenuated; the inner margin straight; the outer with a small projecting tooth opposite the base of the inner margin, where the tragus reaches its greatest width, above this slightly convex, the upper two thirds faintly concave. Conch covered with glandular papillæ and small hairs arising from them, as in *K. picta*.

Thumb large, armed with a strong claw (much larger than in *K. picta*). Wings to the base of the toes, or between the base of the toes and the claws. Posterior margin of the interfemoral membrane with numerous small conical projections, produced apparently by the contraction of the edge. On the upper surface the membranes are almost naked; a few long scattered hairs appear upon the interfemoral membrane and upon the backs of the legs; but the feet are almost naked, and the interfemoral has a few short straight hairs along its posterior margin, not densely fringed as in *K. picta*. Beneath, a few thinly spread hairs appear upon the wing-membrane between the humerus and femur; but the integument is nearly quite naked.

Fur, above and beneath, dark at the base, with shining grayish brown extremities.

Upper incisors of the same relative size as in *K. picta*; the inner incisors have no second, posterior cusp; the outer incisors, which are scarcely half their length, lie close to them, with the summit slightly curved outwards. First upper premolar equal to the third

in vertical extent, but less than it in cross section; second premolar about one third smaller, close between first and third premolar, not separated from the third premolar by an interval. Lower premolars equal in size and equal to the first molar in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 1″·6, tail 1″·75, ear 0″·5, tragus 0″·35, thumb 0″·3, forearm 1″·3, second finger 2″·75, fourth finger 1″·9, tibia 0″·65, foot and claws 0″·28.

Length (of the type specimen, a dried skin), ear 0″·5, forearm 1″·2, second finger 2″·6, fourth finger 1″·7, tibia 0″·6, foot and claws 0″·28.

Hab. Peninsula of India (Sibsagar, Assam; Shillong, Khasia hills); Java; Borneo.

Type in the collection of the E.I. Comp., at South Kensington *.

3. Kerivoula pellucida.

Vespertilio pellucidus, *Waterhouse, P. Z. S.* 1845, p. 6; *Wagner, Suppl. Schreb. Säugeth.* v. p. 742 (1855).
Kerivoula hardwickii, *Tomes, P. Z. S.* 1858, p. 329.

About the same size as the preceding species; but the ears are conspicuously much larger, laid forwards the tips extend one fifth of an inch beyond the end of the nose; the inner margin is regularly convex from the base to the tip, the most anterior part of the convexity of the inner margin projects forwards almost as far as the end of the muzzle: the upper third of the outer margin is occupied by a broad obtusely angular emargination, very different from the short concavity beneath the tip in *K. hardwickii*; the lower two thirds of the outer margin is much expanded, and similar to the same part of the ear in *K. picta*. Tragus similar in shape to that of *K. hardwickii*, but not so much attenuated, nor, proportionately to the size of the ear, so long; the projection on the outer margin, opposite the base of the inner margin, is also very slight and obtuse.

Wings to the base of the toes; posterior margin of the interfemoral fringed with short hairs but not papillated.

Distribution of the fur upon the wing- and interfemoral membranes as in *K. hardwickii*.

Upper inner incisors unicuspidate, very long and slender; outer incisor on each side very short, less than one third the inner incisor in vertical extent, broad at the base, its summit sloping inwards towards and lying against the base of the inner incisor. Lower incisors slightly crowded; the two central incisors with four distinct cusps each, those on each side with three, whilst those next the canines have a small cusp on their inner sides only. Upper premolars as in *K. hardwickii*; lower premolars equal, and nearly equal to the first molar in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 1″·65, tail 2″, head 0″·6, ear 0″·7, tragus 0″·35, forearm 1″·25, thumb 0″·3, second finger 2″·9, fourth finger 2″, tibia 0″·7, foot and claws 0″·3.

* For description of *Kerivoula jagorii*, Ptrs., from Samar Island, see Appendix.

Hab. Philippine Islands.

Type in the collection of the British Museum.

Tomes confounded this species with *K. hardwickii*, though he examined the type of the latter species in Horsfield's collection preserved in the Museum of the East-India Company. The size and shape of the ears, as I have described above, at once distinguish the species. His description of *K. hardwickii*, thus taken from a very different species, led me to consider a specimen in the Indian Museum the type of a new species, which I described as *K. fusca*. The identity of this species with *K. hardwickii* was at once evident to me when I had obtained an examination of Horsfield's type.

4. Kerivoula papillosa.

Vespertilio papillosus, *Temm. Monogr. Mammal.* ii. p. 220; *Wagner, Suppl. Schreb. Säugeth.* v. p. 736.

Ears very similar in shape to those of *K. hardwickii*; but the anterior part of the outer side of the conch does not project so far forwards, and the tragus has a small tooth on its outer margin, which in its lower half is regularly slightly convex; laid forwards the tips of the ears extend to the end of the muzzle.

The upper lip has a dense fringe of hair extending almost as far as the nasal apertures on each side.

Wings from the base of the claws; thumbs and feet large, armed with very large and strong claws; free edge of the interfemoral membrane margined with small papillæ and short hairs.

Fur, above, light shining brown, with darker tips; beneath, paler.

The upper inner incisors are shorter than in *K. hardwickii*, the outer incisors scarcely visible. Dentition in other respects similar to that of *K. hardwickii*.

The following measurements have been taken by me from the type specimen preserved in the Leyden Museum:—

Length, head and body 2″·2, tail 2″·2, ear 0″·65, forearm 1″·7, second finger 3″·6, fourth finger 2″·6, tibia 0″·9.

The above measurements show that this species much exceeds in size all the preceding.

Hab. Java.

Type in the collection of the Leyden Museum.

HARPIOCEPHALUS.

Murina *et* Harpiocephalus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 259 (1842).

Murina *et* Harpyiocephalus, *Gray, Ann. & Mag. Nat. Hist.* xvii. 3rd ser. p. 90, 1866.

Murina, *Dobson, P. A. S. B.* 1873, p. 109; *Ann. & Mag. Nat. Hist.* 1875, xvi. p. 349*.

Muzzle elongated, conical; *nostrils prominent, tubular, produced*

* In my paper (referred to above) "On the Genera *Murina* and *Harpiocephalus* of Gray," published in the 'Proceedings of the Asiatic Society of Bengal'

beyond the upper lip, opening laterally or sublaterally, emarginate between; crown of the head scarcely raised above the face-line; ears thin, generally covered with glandular papillæ; tragus long, attenuated towards the tip, and inclined outwards; thumb very large, with a large strongly curved claw; wings broad, from the base of the toes or attached along the outer toe as far as the base of the claw; interfemoral membrane very hairy, or half-covered above. Skull thick, not vaulted; coronoid process of the mandible much developed vertically.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors on each side parallel, stout, and blunt; posterior upper molar small or consisting of a thin transverse lamina of bone, and sometimes absent in the adult.

The peculiarly shaped elongated tubular nostrils are at once characteristic of this genus. In no other genus of Bats, except *Harpyia* (Pteropidæ), is this peculiar elongation of the nostril beyond the muzzle found. In the different species of *Harpiocephalus* the form and direction of the nasal tubes vary within short limits, but the general characters are the same.

It is very remarkable that of the six species of this well marked genus not less than five should appear to be limited to the Himalayan region, or at least have not yet been discovered elsewhere. This would naturally lead one to suspect that some of these five species exist in name only. However, after repeated examination and direct comparison of the types, or of specimens which had been compared with the types, I believe that the six species here described are not only perfectly distinct, but also, as the following synopsis shows, easily distinguished one from the other.

Synopsis of Subgenera and Species.

I. First upper premolar much smaller than the second ..... Subgenus *Murina*.
  a. Upper third of the outer margin of the ear-conch concave ..... 1. *H. suillus*, Temm., p. 152.
  b. Upper third of the outer margin convex or straight ..... 2. *H. auratus*, Mil.-Edw., p. 153.
II. First upper premolar equal or nearly equal to the second ..... Subgenus *Harpiocephalus*.

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for 1873, I showed that these genera must be united in a single genus, which I then termed "*Murina*," as that name had priority. I have since discovered that Dr. Gray founded his genus *Murina* on a specimen of what he believed was *Vespertilio suillus*, Temm., but which in reality was a specimen of a very different species, from Darjiling, named by me *Murina cyclotis* in 1872, and which belongs to the same section of the genus as *Vespertilio harpia*, Temm. (the type of his genus *Harpiocephalus*, defined in the same paper which contained his definition of *Murina*). It remains, therefore, either to discard both names or to adopt the name *Harpiocephalus*. I prefer the latter course, as the introduction of an additional synonym is avoided.

Prof. Peters, to whom I have mentioned these facts, agrees with me that the name *Murina* should be rejected altogether in a generic sense, and is also of opinion that the term *Harpiocephalus* may be used for the whole genus.

c. Upper third of the outer margin of the ear-conch concave. [p. 154.
a'. Ears narrow, pointed ..... 3. *H. griseus* (Hutton), Ptrs.,
b'. Ears broadly rounded above .... 4. *H. harpia*, Temm., p. 155.
d. Upper third of the outer margin convex or straight.
c'. Inner margin very convex, with a distinct spur near the base; first upper premolar smaller than the second ..... 5. *H. leucogaster*, Mil.-Edw., p. 157.
d'. No spur at base of inner margin of the ear-conch; first upper premolar equal to second ..... 6. *H. cyclotis*, Dobson, p. 158.

1. Harpiocephalus suillus.

Vespertilio suillus, *Temminck, Monog. Mammal.* ii. p. 224 (1839).
Vesperugo suillus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 741.

Muzzle narrow, elongated; nostrils very prominent, consisting of two diverging tubes with an emargination between, opening laterally; viewed from below, the projecting nostrils resemble in shape a small hour-glass placed horizontally at the extremity of the muzzle. Ears moderate, shorter than the head, rounded off at the tips; the upper third of the outer margin angularly emarginate as in *Vespertilio emarginatus*, the middle third commencing by a very abrupt convexity, then slightly concave opposite the middle of the tragus, and terminating in a convex lobe slightly in front of the base of the tragus. Tragus moderately long, attenuated above and slightly curved outwards; a small pointed lobule at the base of the outer margin, succeeded by a slight emargination, immediately above which the tragus attains its greatest width; inner margin slightly convex from the base upwards; outer margin straight below, upper half concave, causing the extremity to incline outwards; tip subacutely pointed.

Wings from the sides of the outer toes, extending almost as far as the claws; extreme tip of the tail projecting; calcanea distinct, extending halfway between the ankle-joint and the extremity of the tail, ending abruptly.

The long fur ends in front between the eyes; but the face is clothed with short fur which leaves the tubular nostrils alone naked. The wing-membranes on the upper surface are covered as far as a line drawn from the middle of the humerus to the knee-joint; the interfemoral membrane is naked, except at the base between the thighs. Beneath, the membranes are even less covered than on the upper surface. Fur moderately long; above, light grayish brown, the extremities dark brown; beneath, light grayish brown throughout.

The upper incisors on each side are nearly equal in size, stout, and obtusely pointed, lying close together by their whole length, the base of the outer incisor close to the canine; the outer incisor is, if any thing, longer, with a distinct cingulum, from which a small

blunt cusp projects outwards and touches the canine. The first premolar is small, scarcely one third the bulk of the second premolar, which very nearly equals the canine in vertical extent, and exceeds it considerably in cross section; the last molar is a simple transverse plate. In the lower jaw the incisors are trifid and slightly crowded, those next the canines longest; the canines are very short; the first and second premolars are shorter than the canine, and the first premolar is slightly less than the second in vertical extent.

Length, head and body 2″, tail 1″·3, head 0″·7, ear 0″·53, tragus 0″·3, forearm 1″·35, second finger 2″·45, fourth finger 1″·9, thumb 0″·35, tibia 0″·65, calcaneum 0″·45, foot and claws 0″·3.

Hab. Malayan archipelago—Sumatra, Java, Flores.

2. Harpiocephalus auratus.

Murina aurata, *Alph. Milne-Edwards, Mammif. du Tibet*, p. 250, pl. xxxvii[b]. fig. 1, and pl. xxxxii[c]. fig. 2 (1872).

Head and muzzle as in *H. suillus*; but the nostrils are differently shaped. Each nostril forms a distinct tube directed sublaterally, with a circular aperture marked by a very small notch on the outer and upper margin. The central part of the upper lip is cut off by a small but distinct groove beneath each nostril, the centre is concave, the sides project and support the base of the nasal tube on each side. Ears small, almost regularly oval; the inner margin of the conch evenly convex, the outer margin similarly convex in the upper two thirds, the lower third slightly flattened opposite the base of the tragus, and terminating in a small but very distinct round lobe. Tragus very acutely pointed, tapering, slightly curved outwards; lower fourth of outer margin straight, sloping slightly outwards, with a rounded projection opposite the base of the inner margin, and a second point slightly higher up, where the tragus attains its greatest breadth.

Thumb very long, armed with a large strong claw. Wings to the base of the claws. Interfemoral membrane large; last caudal vertebra and half antepenultimate vertebra free.

The whole body is thickly covered with hair; both surfaces of the ear-conch are clothed, the inner surface less densely; the fur on the muzzle is short; but the short fur extends almost to the ends of the nasal tubes, and between them a few hairs pass down to the lip. Upon the wing-membrane the fur is thin but long, extending as far as a line drawn from the elbow to a point on the free margin of the membrane nearly half an inch from the ankle; the back of the forearm, as far as the base of the claw of the thumb, is covered with short golden-yellow fur, which also extends upon the second finger as far as the end of its second phalanx, and upon half the metacarpal bone of the fourth finger; the interfemoral membrane is covered with very long hair, which forms a dense fringe along its free margin, extending also upon the legs and backs of the feet, and projecting beyond the extremities of the toes. Beneath, the wing-

membrane is covered as far as a line drawn from the elbow to the knee; and the whole interfemoral membrane is clothed with short bright silvery hairs.

Fur on the upper surface black, with bright golden-yellow extremities more distinct in the middle of the back; beneath black, the extremities of the hairs silvery white, the white being most conspicuous beneath the lower jaw and upon the neck and pubis.

Outer upper incisors considerably larger than the inner ones. First upper premolar much smaller than the second, but not minute; second premolar long and pointed, exceeding the canine both in cross section and in vertical aspect; last molar a narrow transverse lamina. Lower incisors small, equal, and trilobate. Lower canine scarcely exceeding the first premolar in vertical extent; second premolar not equal to the first molar vertically.

Length (of an adult ♂ preserved in alcohol), head and body 1″·4, tail 1″·2, head 0″·6, ear 0″·45 × 0″·3, tragus 0″·26, forearm 1″·1, thumb 0″·35, second finger 2″, fourth finger 1″·6, tibia 0″·5, foot and claws 0″·26, calcaneum 0″·45.

Hab. Thibet.

This very interesting species, which possesses the dentition of one section of the genus and the form of ears peculiar to the other, has been well described by M. Alphonse Milne-Edwards; and the description is accompanied by an excellent plate. There is nothing more striking than the form of the nostrils, which are quite different from those of any other species of Bat.

3. Harpiocephalus griseus.

Murina grisea (*Hutton*), *Peters*, *P. Z. S.* 1872, p. 711; *Peters*, *MB. Akad. Berl.* 1872, p. 258.

Head and muzzle as in *M. suillus*. Ears small, narrow, and pointed, the tip narrowly rounded off; outer margin of the conch as in *H. suillus*, the upper third angularly emarginate, the middle third abruptly convex, the lower third straight, ending opposite the base of the tragus; tragus acutely pointed, moderately long and slightly curved outwards.

Thumb long, with a strong claw; the last (small) vertebra of the tail free; wings from the base of the toes.

The interfemoral membrane is densely covered above with rather long hair, which, however, thins out towards the posterior margin; and a few rather short fine hairs only appear upon the feet.

Fur, above, dark brown with yellowish brown extremities; beneath, similar, but the extreme points of the hairs are rather ashy.

Upper incisors large, with acute summits, almost equal to the canine in vertical extent; inner incisors somewhat larger than the outer, with a second, blunt, posterior cusp arising from the cingulum; upper premolars equal to each other and also to the canines in vertical extent; the second premolar slightly exceeds the first in the antero-posterior diameter of its base; last upper molar nearly equal

to half the antepenultimate molar. The vertical cusp of the lower canine is very short, scarcely exceeding the blunt cusp of the cingulum projecting in front; lower premolars equal, thick and blunt, larger than the canines, but not equal in vertical extent to the anterior cusp of the first molar.

Length, head and body 1″·4, tail 1″·1, ear 0″·45 × 0″·3, tragus 0″·26, forearm 1″·3, thumb 0″·35, second finger 2″·4, fourth finger 1″·8, tibia 0″·45, calcaneum 0″·45, foot and claws 0″·33.

Hab. Jeripanee, N.W. Himalaya; elevation 5500 feet.

I have compared the types of *H. leucogaster* and *H. huttonii*, and find not the least difference.

Of the habits of this species Capt. Hutton writes:—"This species occurs at about 5500 feet elevation on the outer southern range, but does not appear to be very common in the hills, judging from the paucity of specimens procured. One of these flew into a room at Jeripanee, below Mussooree, attracted by the lights, on the 25th July, at about 9 o'clock. Instead of soaring round the room towards the ceiling as Bats generally do, it kept low down, passing under the tables and chairs, as if afraid to emerge into the broad glare of the lamps. This likewise is the mode of flight when searching for insects in the open fields, where it skims closely and somewhat leisurely over the surface of the crops and grass"*.

Fig. *a*.

4. Harpiocephalus harpia.

Vespertilio harpia, *Temminck, Monogr. Mammal.* ii. p. 219, pl. 55 (1839).
Vesperugo harpia, *Keys. & Blas. Wiegm. Archiv*, vi. (1840) p. 2; *Wagner, Suppl. Schreb. Säugeth.* v. p. 740 (1855).
Harpiocephalus rufus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 259 (1842).
Noctulinia lasyura, *Hodgson, J. A. S. B.* 1847, p. 896.
Lasiurus pearsonii, *Horsfield, Cat. Mam. Mus. E.-Ind. Co.* p. 36 (1851); *Blyth, J. A. S. B.* xx. p. 524; *Jerdon, Mamm. of India*, p. 40 (1867).
Vespertilio pearsonii, *Tomes, P. Z. S.* 1858, p. 87; *Blyth, Cat. Mam. Mus. A. S. Beng.* 1873, p. 109.
Murina harpia, *Dobson, P. A. S. B.* 1873, p. 109.

Muzzle rather short, obtusely conical; end of nose projecting con-

* P. Z. S. 1872, p. 712.

siderably beyond the lip, consisting of diverging tubular nostrils opening laterally with a slight emargination between as in *H. suillus*; ear-conch nearly as broad as long, broadly rounded at the tip; outer side flatly emarginate beneath the tip, then slightly convex, again emarginate opposite the base of the inner margin, terminating in a small lobe at a short distance in front of the base of the tragus; inner margin very convex forwards about the junction of its lower and middle thirds, slightly convex and almost horizontal in upper two thirds; tragus with a very small lobe at base of outer margin, attaining its greatest width opposite the base of the inner margin, thence narrowing towards the tip, which is subacutely pointed; inner margin straight or very slightly convex, outer converging to meet it above.

Thumb long, the distal phalanx very long, armed with a large claw. Terminal phalanges of third and fourth fingers bifid at their extremities. Wings from the base of the toes.

The face is very thinly covered with hair; the inner side of the ear-conch is thinly clothed with very short fine hair. On the wing-membrane the fur extends somewhat beyond a line drawn from the middle of the humerus to the outer toe when the limbs are extended as in flight; the whole of the upper surface of the interfemoral membrane is clothed with long thinly spread hairs, which also cover the legs and the wing-membrane for a short distance beyond, extending also more densely upon the calcanea and backs of the feet, and projecting beyond the toes. The backs of the forearms are covered with a few short hairs. Beneath, the wing-membrane is covered with fine hairs as far as a line drawn from the elbow to the knee-joint; the interfemoral has a few very short hairs, chiefly along the tail.

Fig. *b*.

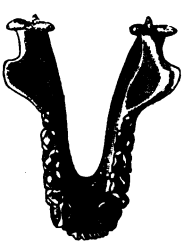

Fig. *c*.

Outer upper incisor shorter than the inner one, and wedged in between it and the canine; upper premolars well developed and nearly equal; posterior or third molar small, deciduous, less than one quarter the size of the second molar, and generally absent in adult animals; third lower molar much smaller than the second,

but elevated slightly above it by its position on the root of the ascending ramus of the jaw. All the teeth are very thick and strong, with blunt cusps (figs. *a*, *b*, *c*).

The skull is shortened in front of the anterior roots of the zygomatic processes. The mandible is also correspondingly shortened, and the teeth are crowded between the canine and the anterior edge of the coronoid process; the third molar is much smaller than the second, and, being placed on the commencement of the ascending ramus, is elevated by its longest cusp above the others (fig. *a*). The coronoid process is greatly developed, probably more so than in any other species of Bat; and its outer surface is deeply hollowed out for the insertion of muscles. Its shape is very similar to that of the common dog; but proportionately to the length of the jaw it is much more developed. Corresponding to this great development of the coronoid process of the mandible, the teeth are very stout and thickly coated with enamel; the cusps of the molars are short and blunt, and the canines much thickened, the small incisors even presenting the same peculiarity.

The bony palate is greatly prolonged backwards, even beyond the middle of the zygomatic arches; and its apparent length is also increased by the absence of the third molar.

Length (of an adult ♀ preserved in alcohol), head and body 2″·5, tail 2″, head 0″·95, ear 0″·7 × 0″·5, tragus 0″·4, forearm 2″, thumb 0″·6, second finger 3″·8, fourth finger 3″, tibia 0″·85, calcaneum 0″·7, foot and claws 0″·4.

Hab. Himalaya (Darjiling; Khasia hills); Sumatra; Java.

The peculiar form of the teeth of *H. harpia* is evidently connected with the nature of the food of the animal. The stout bluntly pointed teeth well coated with enamel are admirably adapted to crush the hard cases of Coleoptera, especially of the larger kinds which a Bat of the size of this species might be expected to capture. In the stomach of one examined by me the crushed cases of some species of these insects were found in abundance.

As we become better acquainted with the habits of these animals it will probably be found that the food of this species is restricted to certain species of Coleoptera possessing extremely hard cases, which would effectually resist the feebler though more acutely pointed teeth of other Bats inhabiting the same localities.

The form of the teeth, the great development of the coronoid process, and shortness of the mandible are all evidently subservient to the same object, and have become modified simultaneously to suit the food of the animal.

5. Harpiocephalus leucogaster.

Murina leucogaster, *Alph. Milne-Edwards, Nouv. Arch. Mus.* vii. Bull. p. 91 (1871); *Mammif. du Tibet*, p. 250 (1872).
Harpyiocephalus huttonii, *Peters, MB. Akad. Berl.* 1872, p. 257; *P. Z. S.* 1872, p. 711.

Head, muzzle, and nostrils as in *H. cyclotis* (p. 158). Ears oval,

broadly and evenly rounded off above; inner margin convex, reaching its greatest convexity at the junction of the lower and middle thirds; near the base, opposite the posterior angle of the eye, a small but distinct tooth-like process projects abruptly forwards from the convex margin of the ear-conch; outer margin convex, slightly flattened in upper third, terminating below in a small ill-defined lobe; tragus acutely pointed and inclined outwards, immediately above the base of the outer margin an obtuse lobule, succeeded by a short emargination, above which the outer margin reaches its greatest convexity.

Wings to the base of the claws; calcaneum projecting very distinctly at its termination; end of the tail projecting.

Fur long and dense. Above brown, grayish at the base; beneath, the throat, chest, and abdomen are whitish, the sides of the body light brown. Distribution of the fur as in *H. cyclotis*.

Outer upper incisors longer than the inner ones; first upper premolar about three fourths the size of the second premolar, and in a plane slightly internal to the canine and second premolar; other teeth as in *H. cyclotis*.

This species resembles *H. cyclotis* in size, in the general form of the ears, and in the distribution of the fur. It is easily distinguished, however, by the presence of the small projecting tooth on the inner margin of the ear-conch, near its base, by the relatively small size of the first upper premolar, and by the colour of the fur, which, though by no means a reliable character in Chiroptera, appears to be quite constant in these species, the bright ferruginous red fur of *H. cyclotis* contrasting strongly with the plain brown fur of *H. leucogaster*.

Length, head and body 1″·9, tail 1″·5, head 0″·75, ear 0″·7, tragus 0″·35, forearm 1″·3, thumb 0″·35, second finger 2″·5, fourth finger 1″·9, tibia 0″·6, foot and claws 0″·3.

These measurements were taken by me from a specimen preserved in alcohol, named by M. Alph. Milne-Edwards.

Hab. North-western Himalaya, Thibet.

Fig. *a*.

6. Harpiocephalus cyclotis.

Murina cyclotis, *Dobson*, *P. A. S. B.* Dec. 1872, p. 210; *J. A. S. B.* 1873, pt. ii. p. 206, pl. xiv.

Muzzle and nostrils as in *H. harpia*, Temm, The ears are nearly as wide as long, and almost quite circular—the only interruption to

the regular convexity of the external margin being a very faint flattening of the upper and outer portion, and a slight convexity opposite the base of the tragus. The tragus is shaped like that of *H. suillus*, but is considerably longer, and tapers to a much finer point.

Wing-membrane attached along the whole length of the outer toe to the base of the claw; feet small, toes of nearly equal length; extreme tip of tail alone free.

The upper surface of the interfemoral membrane is covered with hair, which is most dense at the root of the tail, along the tibiæ, and on the calcanea; it also extends across the tibia to the wing-membrane. The backs of the feet are thickly covered with hair which exceeds the toes in length.

On the upper surface the fur is bicoloured, dark brown at the base, with bright ferruginous tips; beneath paler brown throughout.

The wing-membrane extends further along the outer toe than in *H. suillus*, occupying its entire outer side, the terminating claw being alone free. This distinguishes the species at once from *H. griseus*, Hutton, in which the wing-membrane extends only as far as the base of the first phalanx of the toe.

Fig. *b*.

Fig. *c*.

The upper incisors are long and slender; the outer incisor is shorter than the inner, and almost touches the canine at its base, but is widely separated from it at its extremity; at the outer side of its base a small cusp projects outwards, as in *H. suillus*. The first premolar is scarcely equal to half the canine in vertical extent, but is nearly equal to the second premolar; the second molar is equal to the first; but the third is very narrow, forming a simple bony lamina as wide as the preceding molar, but less than half its antero-posterior diameter. In the lower jaw the last molar is smaller than the preceding one, but possesses the same number of cusps; the other molars and premolars present about the same relative proportions as in the upper jaw.

On the whole the teeth are similar to those in *H. harpia*, agreeing in this respect with *H. griseus* and *H. leucogaster*, but differing remarkably from *H. suillus* and *H. auratus*, in which the first upper

premolar is much smaller than the second, which equals the canine in vertical extent.

In *H. harpia* the skull is proportionately more swollen and more elevated between the centres of the zygomatic arches than in *H. cyclotis*, and the sagittal crest much more developed; the coronoid process of the mandible is also considerably elevated above the condyle; but its general form is triangular, not rounded as in *H. harpia*: the bases of the skulls of these two species are very similar, the only difference observable being the greater backward prolongation of the bony palate in *H. harpia*; but this is perhaps more apparent than real, owing to the absence of the third upper premolar in *H. harpia* (compare figs. *a*, *b*, *c* with figs. *a*, *b*, *c antea*, pp. 155, 156.)

Length, head and body 1″·7, tail 1″·5, head 0″·7, ear 0″·6, tragus 0″·35, forearm 1″·3; thumb—metacarp. 0″·1, ph. 0″·2; second finger—metacarp. 1″·2, first ph. 0″·55, second ph. 0″·7; fourth finger—metacarp. 1″·25, first ph. 0″·4, second ph. 0″·35; tibia 0″·6, calcaneum 0″·5, foot and claws 0″·3.

Hab. Himalaya (Darjiling); Ceylon.

MINIOPTERUS.

Miniopterus, *Bonaparte, Faun. Italica*, fasc. xxi. (1837); *Gray, Mag. Zool. & Bot.* 1838, p. 497; *Keys. & Blas. Wiegm. Archiv*, 1840, p. 4; *Tomes, P. Z. S.* 1858, p. 117.

Crown of the head abruptly and very considerably raised above he face-line; ears separate, rhomboidal, the outer margin carried forwards to the angle of the mouth; tragus like that in *Vesperugo*; nostrils simple, opening sublaterally by lunate apertures, the extremity of the nose separated from the upper lip on either side by a narrow vertical groove; muzzle broad, obtuse; the *first phalanx of the second or longest finger very short*; wings to the ankles or to the tibiæ; feet long, slender; toes nearly equal in length; *tail as long as the head and body, wholly contained within the interfemoral membrane.*

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper incisors short, nearly equal in vertical extent, in pairs on each side, separated from the canines by a space.

Range. Generally distributed throughout the Eastern hemisphere on both sides of the equator; not extending, however, into the colder regions of the temperate zones.

1. Miniopterus schreibersii.

Vespertilio schreibersii, *Natterer, in Kuhl, Deutsch. Flederm. Wetterau. Ann.* iv. p. 41 (1819); *Desmarest, Mammalogie*, p. 138 (1820); *Temminck, Monogr. Mammal.* ii. p. 174 (1839).

Miniopterus ursinii, *Bonap. Faun. Ital.* (1839).

Vespertilio orsinii, *et* blepotis, *et* dasythrix, *Temminck, l. c.* pp. 179, 212, 268.

Trilatitus blepotis, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 258.

Miniopterus schreibersii, *Wagner, Suppl. Schreb. Säugeth.* v. p. 735 (1855); *Tomes, P. Z. S.* 1858, p. 117.

Head greatly elevated above the face-line; muzzle rather short; glandular prominences well developed laterally, increasing the width of the face; margin of the eye prominent; a deep horizontal groove on the side of the face, parallel to the mouth, below the eye; ears much shorter than the head; the inner margin of the ear very convex forwards, projecting in front of the eye, then curving almost horizontally backwards to the tip, the position of which is determined only by a slight flattening of the upper third of the outer margin; outer margin straight above, emarginate opposite the base of the tragus, and terminating rather abruptly in a moderately deep square-ended lobe close to the angle of the mouth. Tragus rather more than twice as long as broad, maintaining the same breadth upwards, and obtusely rounded off above; the inner margin slightly concave above; the outer margin correspondingly convex in its upper third and straight in its lower two thirds, parallel to the inner margin; above the base a slight convexity appears in most specimens, but no indication of a distinct lobule as in *Vesperugo*.

Thumb moderate; terminal phalanx of longest finger flexed forwards, in repose, on the under surface of the metacarpal, reaching as far as the junction of the proximal and middle thirds of that bone; wings to the ankles or slightly higher up; feet long and slender, the outer toe nearly on a level with the extremities of the other toes; tail slightly longer than the head and body, wholly contained within the interfemoral membrane; no postcalcaneal lobe.

The face in front of the eyes is covered with short fur interspersed with longer hairs arising from the glandular prominences on the sides of the muzzle; on the wing-membranes the fur extends as far as a line drawn from the end of the proximal third of the humerus to the middle of the femur, and upon the interfemoral to a very small extent, about as far as the end of the first caudal vertebra. Beneath, the wing-membrane is clothed as far as a line drawn from the middle of the humerus to the knee; the interfemoral has a few long hairs about the root of the tail, but about half the surface of the membrane is covered with a very fine pubescence; a band of fine short hairs passes outwards on the wing-membrane behind the forearm to the carpus.

The colour of the fur varies very considerably. The basal half of the hairs always dark grayish black, dark brown, or black, the extremities varying from light gray to light reddish gray, dark reddish brown, and black.

The inner upper incisor on each side is but slightly longer than the outer incisor, and slants inwards and forwards; on its outer side, near the base, a small blunt cusp; the outer incisor unicuspidate, blunt, and slanting less inwards than the inner one. Canines moderately long and straight, with a horizontal slightly raised cingulum, without a second cusp or basal projection, First upper premolar unicuspidate, with a small, narrow, acutely pointed cusp and a broad cingulum, more developed posteriorly, touching the cingulum of the

second premolar, which is also horizontally expanded, but in an anterior direction; a wide space is thus caused between the summits of the canine and second premolar, and the extremity of the first premolar is much closer to the canine than to the second premolar; the whole tooth is also slightly pushed inwards. The last molar is somewhat more than half the antero-posterior diameter of the second premolar. In the lower jaw the four front incisors are nearly equal in size, and are trilobed, those next the canines larger, with rounded summits, and a single furrow on the inner side, cutting off a low blunt cusp. The cingulum of the lower canines is horizontal behind, directed upwards, forwards, and inwards in front, forming a small blunt projection above the inner incisor. The first and second lower premolars are small and nearly equal, less than half the size of the third premolar, which, in vertical extent, exceeds the longest cusp of the first molar.

Hab. From Japan to the Philippine Islands, Amboyna, Timor, and Australia. Westward, in Burmah, but not yet recorded from the peninsula of India, though found in Ceylon; Asia Minor (Syria); Europe as far north as Lower Austria and Switzerland; apparently generally distributed throughout the African continent and Madagascar.

I have examined specimens from all the localities mentioned above, and cannot find any distinguishing mark. Examples from northern localities have the extremities of the fur gray, those from tropical and subtropical districts appear intensely black throughout, or have the extreme tips of the fur slightly grizzled*.

(For measurements of this and of other Asiatic species see Table of comparative measurements, p. 163.)

Subsp. *a.* **Miniopterus pusillus.**

Miniopterus australis, *Dobson* (non *Tomes*), *J. A. S. B.* xl. p. 265.

This form inhabits probably the same countries with *M. schreibersii*, which it resembles in all respects except in size and in the distribution of the fur. The head and forearm are conspicuously shorter; and these characters are not founded on observation of immature specimens, but on measurements taken from perfectly adult individuals, obtained in large numbers, at different times, from the same and different localities. In all these the length of the head never exceeded 0″·6, and that of the forearm 1″·6.

On the upper surface the fur extends upon the interfemoral mem-

* Dr. Peters is of opinion, from Horsfield's description of *Vespertilio tralatitius* from Java, that that species is identical with Temminck's *V. blepotis* = *Miniopterus schreibersii*. Certainly, if we could depend upon the accuracy of Horsfield's description, this would appear to be so; but the type of *V. tralatitius*, Horsf., in the collection of the Museum of the E.I. Company is undoubtedly of the same species as the type of *V. imbricatus*, Horsfield, = *V. macrotis*, Temm. As Horsfield made five species from differently preserved specimens of *Phyllorhina larvata*, it is not difficult to believe that he made two from the specimens of *V. imbricatus* collected by him.

brane as far as the end of the third caudal vertebra; in other respects the distribution is similar to that of *M. blepotis*.

Fur intensely black throughout, the extreme tips of the hairs sometimes grayish.

On examining specimens in the British Museum which had been named *Miniopterus australis* by Tomes, I found that examples of this form were included under the same name with specimens from the Loyalty Islands, collected by Sir G. Grey, and which differ considerably from it, both in the greater length of the muzzle and the distribution of the fur, more than three fourths of the upper surface of the interfemoral membrane being covered. The specimens from the Loyalty Islands I consider the types of Tomes's *M. australis*, though the bottle containing them was marked with the name and locality only.

2. Miniopterus tristis.

Vespertilio tristis, *Waterhouse, Ann. & Mag. Nat. Hist.* xvi. p. 50 (1845); *Wagner, Suppl. Schreb. Säugeth.* v. p. 743 (1855).
Miniopterus tristis, *Tomes, Proc. Zool. Soc.* 1858, p. 124.

In general form and in the very dark colour of the fur closely resembling the southern form of *M. schreibersii*, which is also found in the same country. The muzzle, however, is comparatively shorter, broader, and more obtuse; the outer margin of the tragus has a *distinct triangular lobule* near the base, which, taken with the very much larger size of the animal, at once distinguishes the species. The fur is very dark brown throughout, which, when moistened in spirit, appears intensely black. The distribution of the fur is similar to that in *M. schreibersii*.

Length (of the single type specimen), head and body 2″·4, tail 2″·6, head 0″·85, ear 0″·65, tragus 0″·3 × 0″·13, forearm 2″·1, thumb 0″·33, second finger 4″·1 (first ph. 0″·5), third finger 2″·9, fourth finger 2″·2, tibia 0″·75, foot and claws 0″·45.

Hab. Philippine Islands.

Type in the collection of the British Museum.

	Length, head and body.	Tail.	Head.	Ear.	Tragus.	Forearm.	Thumb.	Second finger.	Ditto, first phalanx.	Third finger.	Fourth finger.	Tibia.	Foot and claws.	Sex.
M. schreibersii (Ceylon)	2·2	2·2	0·7	0·53	0·23	1·75	0·3	3·4	0·45	2·4	2·0	0·75	0·4	♂
M. schreibersii (Upp. Burma)*	2·25	2·3	0·7	0·53	0·23	2·0	0·3	3·8	0·45	...	2·25	0·8	0·4	♀
M. schreibersii (Philippines) ...	2·1	2·1	0·7	0·5	0·23	1·75	0·3	3·3	0·4	2·4	1·9	0·75	0·38	♂
M. schreibersii (South Africa) .	2·05	2·2	0·7	0·5	0·22	1·8	0·3	3·4	0·45	2·5	2·1	0·8	0·4	♀
M. schreibersii (Spain).....	2·05	2·3	0·7	0·5	0·23	1·75	0·3	3·5	0·45	2·55	2·1	0·75	0·4	♂
Subsp. *pusillus* (Nicobar Isl.) .	1·8	1·85	0·6	0·4	0·2	1·6	0·2	3·0	0·38	...	1·85	0·6	0·3	♂
Subsp. *pusillus* (Madras)	1·9	1·9	0·6	0·43	0·2	1·65	0·25	...	...	...	...	0·7	0·33	♂
M. tristis (Philippines)	2·4	2·6	0·85	0·65	0·3	2·1	0·33	4·1	0·5	2·9	2·2	0·75	0·45	♀

* Largest of 32 specimens collected by Dr. J. Anderson at Isagine, Upper Burma, during the second expedition to Yunan.

Family V. EMBALLONURIDÆ.

Brachyura *et* Molossi, *Peters, MB. Akad. Berl.* 1865, p. 257.
Noctilionidæ *et* Vespertilionidæ (in part), *Gray, Ann. & Mag. Nat. Hist.* 1866, xvii. p. 89.
Emballonuridæ, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 347.

Bats with nostrils opening by simple or valvular apertures at the extremity of the muzzle, not surrounded or margined by distinct cutaneous foliaceous appendages*; with generally large, often united ears, arising by their inner margins from the sides of the forehead; with short, occasionally minute tragi, usually expanded above; with two phalanges in the middle finger, of which the first is folded (in repose) forwards on the upper surface of the metacarpal bone†; with, generally, short legs and well-developed fibulæ.

The number of the teeth, especially of the incisors, varies so much, even among species of the same genus, that no general dental formula can be given. The upper incisors are, in most of the genera, large, and their summits are directed inwards and forwards; the lower incisors are very small, and crowded in the narrow space between the canines; molars well developed, with W-formed cusps.

The *Emballonuridæ* are generally easily distinguished by the projecting extremity of the muzzle, by the peculiar manner in which the first phalanx of the middle finger is folded forwards (in repose) on the back of the metacarpal bone, by the tail, which either perforates the interfemoral membrane or is produced far beyond it, and by the upper incisors, which are generally a single pair and have their summits directed inwards and forwards.

Hab. The tropical and subtropical regions of both hemispheres.

EMBALLONURA.

Emballonura, *Temminck* (in part), *Van der Hoeven, Tijdsch. Natur. Gesch.* p. 22 (1839).
Emballonura, *Peters, MB. Akad. Berl.* 1867, p. 479.

Ears arising separately by their inner margins from the sides of the forehead; outer margin of the ear-conch terminating in a long lobe behind the angle of the mouth below the eye; tragus longer than broad, generally slightly expanded above; apertures of the nostrils circular; wings from the ankles or tarsi; antebrachial membrane without a pouch; interfemoral membrane large, extending much beyond the point at which it is pierced by the tail, and having its posterior free margin supported by long calcanea.

Forehead convex; muzzle slightly flattened above and laterally.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

* A rudimentary nose-leaf in *Rhinopoma*.

† Except in *Noctilio* and *Mystacina*. In the latter genus, represented by a single species only, the first phalanx of the middle finger is folded forwards on the *inferior surface* of the metacarpal bone.

Upper incisors in pairs, separated from the canines and also in the middle.

Range. From Sumatra and Java, through the islands of the Malay archipelago, to the Navigators' group in the Pacific Ocean.

Emballonura monticola.

Emballonura monticola, *Temminck, Van der Hoeven, Tijdsch. voor Natur. Gesch.* v. p. 25, pl. 2. figs. 1, 2 (1839).
Vespertilio (Nycticejus) electo, *Eydoux et Gervais, Voy. 'Favorite,'* 2e part. Zoology, p. 7 (1839).
Emballonura discolor, *Peters, MB. Akad. Berl.* 1861, p. 711.

Muzzle obtuse in front, the extremity projecting slightly beyond the lower lip; centre of the upper lip with a small, naked, triangular projection below and between the nostrils; nasal apertures circular, directed forwards and downwards. Eyes large, rather prominent. Ears narrow, slanting backwards, the inner margins arising from a point above the eye, straight in the upper half; tip of the ear narrowly rounded off; upper third of the outer margin slightly concave, then slightly convex, emarginate opposite the base of the tragus, terminating in a rounded lobe midway between the base of the tragus and the angle of the mouth: tragus narrow, maintaining the same breadth to the tip, which is rounded off; inner margin slightly convex, outer slightly concave.

Wing-membrane from the tarsus. Feet small; toes nearly equal. Last two vertebræ of the tail projecting on the upper surface of the interfemoral membrane. Interfemoral membrane large, convex behind; calcaneum very long.

Upper incisors slender, nearly equal in vertical extent, the inner one on each side slightly longer, in pairs, separated from the canines by a space, and also in the middle; lower incisors not crowded; first upper premolar minute, in the centre of the space between the canine and the second premolar; first lower premolar small, half the vertical height of the second, but nearly equal to it in cross section.

Length, head and body 1″·5, tail 0″·5, head 0″·55, ear 0″·5, tragus 0″·18, forearm 1″·4, thumb 0″·2; second finger—metacarp. 1″·2, first ph. 0″·3, second ph. 0″·6; third finger—metacarp. 1″, first ph. 0″·3, second ph. 0″·28; fourth finger—metacarp. 0″·9, first ph. 0″·3, second ph. 0″·2; tibia 0″·45, calcaneum 0″·4, foot and claws 0″·22.

Hab. Java, Sumatra, Borneo; Philippine Islands*.

* EMBALLONURA NIGRESCENS.

Mosia nigrescens, *Gray, Voy 'Sulphur,' Mammal.* p. 25.

This species is smaller than *E. monticola*, and has been found in Australia and Ternate. It may hereafter be found within the limits of Asia.

The following measurements have been taken from the type, an apparently adult ♂, in the collection of the British Museum:—

Length, head and body 1″·4, tail 0″·4, head 0″·4, ear 0″·45, tragus 0″·15, forearm 1″·25, thumb 0″·18; second finger—metacarp. 1″·1, 1st ph. 0″·35, 2nd ph. 0″·48; fourth finger—metacarp. 0″·8. 1st ph. 0″·3, 2nd ph. 0″·15; tibia 0″·4, calcaneum 0″·35, foot and claws 0″·2.

TAPHOZOUS.

Taphozous, *Geoffroy, Descrip. de l'Egypte*, ii. p. 126 (1812); *Desmar. Mammal.* p. 130 (1820); *Temminck* (excl. *T. lepturus*), *Monogr. Mamm.* ii. p. 277; *Wagner, Suppl. Schreb. Säugeth.* v. p. 684.

Crown of the head very slightly raised above the face-line; a deep frontal concavity between the eyes; ears separate, their inner margins arising by a short band from either side of the frontal depression; muzzle very conical, flattened above and beneath, the extremity not projecting beyond the lower lip; tragus short, narrowest opposite the base of the inner margin, expanded above; eyes rather large, with a distinct horizontal groove on the face beneath; thumb short, with a small but very acute claw; first phalanx of the middle finger folded (in repose) on dorsum of metacarpal bone; middle finger very long, the metacarpal bone generally equal to the whole length of the last finger; feet long, slender, the outer toe as long as the middle toe, the inner toe shortest; tail perforating the interfemoral membrane and appearing on its upper surface.

Dentition. Inc. $\frac{1-1}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillaries cartilaginous, supporting a pair of small weak incisors, one on each side, separated by an interval in the centre, and also from the canines, often absent in adult animals: canines rather close together, much curved forwards, separated from the second premolar by a wide space, in which the first minute premolar scarcely appears above the level of the gum; second upper premolar large, exceeding the molars in vertical extent; last molar consisting of a narrow transverse lamina. (This represents the character of the teeth throughout all the known species of the genus; they scarcely vary in the most widely separated species.)

Mesopterygoid fossa very narrow, the pterygoid plates terminating in long slender hamular processes; immediately behind the basisphenoid is deeply excavated on each side in front of the cochleæ, the excavations separated by a narrow bony lamina connecting the roof of the mesopterygoid fossa with the basioccipital; postorbital process very long, connected by ligament with the zygoma and thus completely circumscribing the orbit in front.

Range. From Australia, New Guinea, and the Philippine Islands, through the Malay archipelago, to Siam, Burma, India, Palestine, Africa (throughout which continent it appears to be generally distributed, except perhaps in the extreme south and north), Madagascar, Bourbon, and Mauritius.

Synopsis of Subgenera and Species.*

A. Radio-metacarpal pouch distinct; lower lip scarcely grooved in front..... Subgenus *Taphozous*, p. 167.

a. Radio-metacarpal pouch well developed.

a'. No gular sac in male or female.

* Of the Asiatic species only. A monograph of the genus *Taphozous* has been published by me in P. Z. S. 1875, p. 546.

a''. Fur of the back extending upon part of the wing and interfemoral membranes; extremity of tail thickened. 1. *T. melanopogon*, p. 167.

b''. Fur of the back very narrow across loins, not extending upon the membranes; extremity of the tail not thickened ..... 2. *T. theobaldi*, p. 168.

b'. Gular sac present in males, rudimentary or absent in females.

c''. Gular sac quite absent in ♀; throat naked beneath; ears shorter than the head ..... 3. *T. longimanus*, p. 170.

b. Radio-metacarpal pouch very small; fur very short, not extending to the membranes ..... 4. *T. nudiventris*, p. 171.

B. No radio-metacarpal pouch; lower lip divided in the centre of its upper surface and in front by a deep narrow groove Subgenus *Taphonycteris*, p. 172.

a. Gular sac developed (but smaller) in ♀ also; fur dark brown above and beneath 5. *T. saccolaimus*, p. 172.

b. Gular sac rudimentary in ♀, the margins alone developed; fur brown above, pure white beneath ..... 6. *T. affinis*, p. 173.

A. *Radio-metacarpal pouch distinct; lower lip scarcely grooved.*
Subgenus TAPHOZOUS.

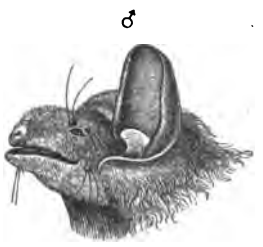

Fig. *a*.

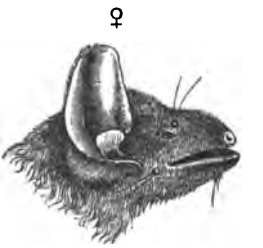

Fig. *b*.

1. Taphozous melanopogon.

Taphozous melanopogon, *Temm. Monog. Mammal.* ii. p. 287; *Cantor, J. A. S. B.* xv. p. 180; *Wagner, Suppl. Schreb. Säugeth.* v. p. 687; *Dobson, P. A. S. B.* Aug. 1872, p. 153.
Taphozous philippinensis, *Waterhouse, P. Z. S.* 1845, p. 9.

No gular sac, the openings of small pores appearing along a line corresponding to the position of the mouth of the gular sac in other species; in some male specimens the hair behind the openings of these pores is very long, forming a dense black beard (figs. *a*, *b*).

Radio-metacarpal pouch large. Wings from the tibiæ above the ankles.

The fur of the head extends upon the face as far as a line joining the inner corners of the eyes; the inner side of the ear-conch is covered with a few hairs; posteriorly the ears are clothed at their

bases, naked above except where a row of fine hairs fringes the outer margin.

On the upper surface the fur of the body extends upon the wing-membrane about one third the length of the humerus and femur, the remainder of the wing and antebrachial membranes are quite naked; posteriorly, the interfemoral is covered thinly almost as far as the point where the tail perforates it; inferiorly, the fur of the body extends outwards upon the wing-membrane as far as a line joining the middle of the humerus and femur, beyond this, as in other species, a band of very short fine fur extends along the posterior margin of the forearm to the carpus; the feet are naked, except where a few hairs arise at the base of the claws on the back of the terminal phalanges of the toes.

Above, the fur is white at the base, then dark brown, the extreme tips slightly grayish; beneath, white at the base, then paler brown than on the upper surface, the extreme tips grayish as above.

The females of this species (in which the black beard is not developed) resemble those of *T. longimanus*; they are readily distinguished, however, by the absence of the rudimentary gular sac and hairy condition of the chin, by the larger ears, and especially by the tail, which is thickened and somewhat laterally compressed towards the tip, though in every other species of the genus it tapers slightly towards its extremity.

The black beard is not always developed in the males; its development seems to depend on certain conditions as yet not known; probably it appears periodically during the rutting-season. In five male specimens in the Indian Museum this beard is well developed, while out of over one hundred specimens received by M. Milne-Edwards from Cochin China, examined by me in the Paris Museum, two only possessed the beard.

Length (of an adult ♂ preserved in alcohol), head and body 3″·1, tail 1″, head 1″, ear (anteriorly) 0″·8, tragus 0″·25, forearm 2″·45, thumb 0″·32; second finger—metacarp. 2″·2, 1st phal. 0″·8, 2nd phal. 0″·9; fourth finger 2″·1; tibia 0″·85, calcaneum 0″·6, foot and claws 0″·42.

The above measurements are remarkably constant in adult individuals from very distant localities, especially the relative lengths of the bones of the second or middle finger.

Hab. Peninsula of India (eastern coast); Burma; Cochin China; Java; Philippine Islands.

2. Taphozous theobaldi.

Taphozous theobaldi, *Dobson, P. A. S. B.* Aug. 1872, p. 152.

Gular sac absent in both sexes. Inner margin of ear minutely papillate; ears larger than in any of the Asiatic species of the subgenus. Radio-metacarpal pouch well developed, larger than in *T. melanopogon*.

The fur of the head extends upon the face as far as a line drawn between the corners of the eyes; the remainder of the muzzle is

nearly naked; ear-conch naked, except where a few hairs clothe the basal portion of its inner surface; posteriorly the ears are naked except at the base and along their outer margins.

On the upper surface the wing- and interfemoral membrane are completely devoid of hair, the fur being strictly limited to the body; laterally, the limit of the fur of the back is defined by a well-marked line, convex *inwards* in the lumbar region (in *T. saccolaimus* and in *T. nudiventris* the line of fur is slightly convex *outwards* in the same situation), so that in this species the space occupied by fur in the lumbar region is narrower than in any of the other species, and appears, as in *T. saccolaimus* and *T. nudiventris*, to depend on the position of attachment of the wing-membrane. The tail has but three or four long, very fine hairs.

Inferiorly, the chin is naked as far as the anterior prolongation of the external margin of the ears; the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus and femur; from this a band of fine hairs extends outwards to the carpus as in the other species; the antebrachial membrane is clothed with short, very fine, almost invisible hairs; the interfemoral membrane is naked; the backs of the toes are covered with very short hairs.

The following measurements are taken from a male and female specimen in the Indian Museum, contained in a bottle labelled "*T. saccolaimus*, Temm. Tenasserim."

	♂ in.	♀ in.
Length, head and body	3·15	3·35
„ tail	1·25	1·35
„ do. free from membrane	0·7	0·6
„ head	1·15	1·15
„ ear (anteriorly)	1·0	1·1
Breadth, ear „	0·6	0·6
Length, tragus	0·26	0·28
Breadth, „	0·2	0·2
Length, forearm	2·95	3·0
„ thumb	0·45	0·45
„ second finger	4·4	4·7
„ fourth „	2·4	2·5
„ tibia	1·0	1·15
„ calcaneum	0·9	0·9
„ foot and claws	0·6	0·65

Hab. Tenasserim.

This species is distinguished from *T. melanopogon* by its much larger ears, and by the absence of fur on the upper surface of the wing- and interfemoral membranes.

The only specimens yet obtained were collectod by Dr. Oldham in the Tenasserim Province, and presented by him to the Indian Museum.

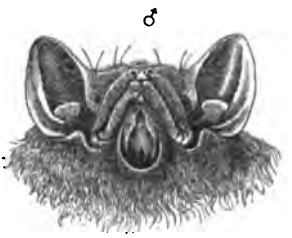

Fig. *a*.

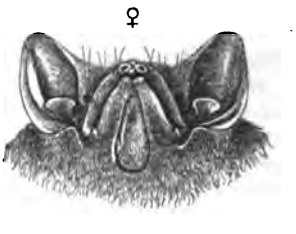

Fig. *b*.

3. Taphozous longimanus.

Taphozous longimanus, *Hardwicke, Linn. Trans.* xiv. p. 525*.
Taphozous fulvidus *et* brevicaudus, *Blyth, J. A. S. B.* x. p. 975.
Taphozous cantori, *Blyth, J. A. S. B.* xi. p. 784.

The gular sac is less developed than in *T. saccolaimus*, and in the female is represented by a rudimentary fold of skin and nakedness of the integument in the same situation (figs. *a*, *b*). Radio-metacarpal pouch moderately developed. Inner margin of ear smooth, not papillate; ears about same size as in *T. saccolaimus*. Upper incisors 0·05 inch long and very slender in some individuals, in the greater number of specimens absent.

The fur of the head extends upon the face to about the same extent as in *T. saccolaimus*; but the muzzle is almost quite naked; the inner side of the ear-conch is rather thickly covered with moderately long fine hair; posteriorly the ear is almost naked, but a few fine hairs are ranged along the outer margin; the tragus is completely devoid of hair.

On the upper surface the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus and femur; the antebrachial membrane has a few hairs along the sides of the humerus and forearm; posteriorly the interfemoral membrane is covered as far as the point of exit of the tail, along which some long fine hairs extend; the remainder of the interfemoral membrane is clothed with very short, almost invisible, fur, which extends along the tibiæ to the feet, becoming longer on the terminal phalanges of the toes.

* In Hardwicke's original description of this species no mention is made of a gular sac; and Temminck (Monogr. Mammal. vol. ii. p. 289), from an examination of a mutilated skin, states there is none! But Hardwicke very distinctly states that the species described by him is common about Calcutta, inhabiting cellars, old houses, &c. The species I have here described is very common about Calcutta; and I have not yet obtained any other. Hardwicke's picture in the 'Linnean Transactions' accurately represents it.

As female specimens are far more commonly obtained than male, it is probable Hardwicke's description was taken from the former, which will account for his not mentioning the gular pouch. No value can be assigned to Temminck's description taken from a mutilated skin, belonging probably to a female specimen. Four specimens obtained by me at Calcutta, one male and three females, were found to correspond precisely with the measurements of *T. longimanus* given by Hardwicke.

Beneath, the fur in front of the gular pouch, under the chin, is very short, and the skin there almost naked; the antebrachial membrane is covered with longer fur than on the upper surface; on the wing-membrane the fur of the body extends more densely and further outwards than above, being limited by a line joining the distal and middle thirds of the humerus and femur, but a narrow band of hairs extends outwards to the carpus; posteriorly the interfemoral membrane is naked, except at the root of the tail. Fur varying from dark brown to black, above and beneath, the bases of the hairs white.

The following are the measurements of an adult male and female, the male with a well-developed gular sac:—

	♂ in.	♀ in.
Length, head and body	3·10	3·10
„ tail	1·00	1·15
„ do. free from membrane	0·55	0·70
„ head	0·95	0·95
„ ear (anteriorly)	0·75	0·8
Breadth, ear „	0·40	0·45
Length, tragus	0·22	0·25
Breadth „	0·18	0·18
Length, forearm	2·35	2·45
„ thumb	0·28	0·30
„ second finger	4·05	4·20
„ fourth „	2·05	2·15
„ tibia	0·90	0·95
„ calcaneum	0·75	0·85
„ foot and claws	0·43	0·45

Hab. Peninsula of India (Bengal, Southern India); Ceylon; Burma.

4. Taphozous nudiventris.

Taphozous nudiventris, *Cretzschmar, Rüppell, Atlas, Voy. Egypt*, p. 70; *Temminck, Monog. Mammal.* ii. p. 280; *Wagner, Suppl. Schreb. Säugeth.* v. p. 684.

A small gular sac in males, rudimentary in females. Ear-conch papillate along inner margin. Radio-metacarpal pouch very small. Wings from the tibiæ above the ankles.

In front, the fur of the head does not extend upon the face beyond the frontal depression, and the muzzle is nearly naked; ear-conch with a few fine hairs only on its inner side; tragus naked. The fur of the back is limited laterally and posteriorly by a well-defined line, beyond which the finest hair does not pass; it does not extend upon the wing-membrane or upon the interfemoral; and the humerus, forearm, and antebrachial membrane are quite naked; posteriorly its termination is separated from the point of exit of the tail by a considerable interval, about three quarters of an inch. A few very long hairs, almost as long as in the species of *Molossus*, arise from the backs of the toes. Beneath, the throat is nearly naked; the wing-membrane is covered as far as a line drawn from the middle of the humerus towards the pubis, and a band of fine hairs extends

outwards, as in the two preceding species, to the carpus. The interfemoral membrane and legs are quite naked.

Length, head and body 3″·7, tail 1″·6, ear 0″·85, tragus 0″·25, forearm 2″·95, thumb 0″·45; second finger—metacarp. 2″·55, 1st phal. 1″·1, 2nd phal. 1″·2; fourth finger 2″·8, tibia 1″·2, foot and claws 0″·6.

This species has large deposits of fat in the loose integument about the root of the tail. This is especially found in specimens taken during the cold season, when they probably hibernate, and seems to indicate that this is the most northerly species of *Taphozous*; for I have not observed similar deposits of fat in any other species of the genus, indeed in no other species of Bat, except in *Rhinopoma*, which inhabits the same countries.

Hab. Asia Minor (Palestine); Egypt, Nubia.

Subsp. **Taphozous kachhensis.**

Taphozous kachhensis, *Dobson, J. A. S. B.* 1872, p. 211.

Gular sac absent in both male and female; its usual position indicated in the male by a semicircular fold of skin and nakedness of the integument in this situation. In other respects similar to *T. nudiventris*. The deposits of fat about the tail very large.

Length, head and body 3″·6, tail 1″·25, head 1″·3, ear 0″·9, tragus 0″·25, forearm 2″·95, thumb 0″·45; second finger—metacarp. 2″·7, 1st phal. 1″·1, 2nd phal. 1″·3; fourth finger 2″·7, tibia 1″·1, foot and claws 0″·65.

Hab. Kachh, N.W. India.

B. *No radio-metacarpal pouch; lower lip deeply grooved.*
Subgenus TAPHONYCTERIS.

5. Taphozous saccolaimus.

Taphozous saccolaimus, *Temminck, Monogr. Mammal.* ii. p. 285.
Taphozous crassus, *Blyth, J. A. S. B.* xiii. p. 491, xxi. p. 348.
Taphozous pulcher, *Elliot, J. A. S. B.* xiii. p. 492.

The centre of the lower lip is occupied by a deep but narrow groove, which extends in front also; tragus rather small, concave on its front surface, its upper margin evenly rounded from both sides; the gular sac is well developed in both sexes, but larger in the male. Radio-metacarpal pouch absent. Inner margin of ear smooth, not papillate; ear-conch shorter than the head.

The fur of the head extends upon the face slightly in front of the eyes; and the muzzle is covered with short thinly spread hairs; ears almost naked, inner side of conch covered with a few long fine hairs; upper margin of tragus bordered posteriorly by a fringe of fine hairs; posteriorly the bases of the ears are covered, and about one third of the external margin is fringed with hair.

On the upper surface the fur of the body scarcely extends upon the wing-membrane, the point of attachment of which seems to limit

its extent; posteriorly it terminates, as on the sides, in a well-defined line curved backwards, the root of the tail limiting its extent in this direction; the interfemoral membrane, thighs, and tibiæ are quite naked; and the protrusible portion of the tail has but a very few, moderately long, fine hairs; the feet are quite naked, thus differing from the greater number, if not from all the species of the genus; the wing-membrane is altogether naked, except, as already noticed, at the very line of its attachment to the body.

Beneath, the chin and sides of the gular sac are covered with very short hair; the thorax and abdomen are clothed, as is the back, with moderately long, dense hair; the antebrachial membrane has a few fine hairs, and the wing-membrane is covered as far as a line joining the middle of the humerus and femur; a band of fine hairs extends outwards on the membrane posterior to the elbow and forearm to the carpus, occupying at its termination about the anterior third of the surface of the membrane between the forearm and the fifth metacarpal bone; posteriorly, a small triangular portion of the interfemoral membrane, as far as the point where the tail passes to the upper surface, is covered, the hairs being in greatest number along the caudal vertebræ; the thighs and legs are naked.

Fur, above, white at the base, the terminal three fourths of the hairs black, with a few irregular small white patches on the back; beneath, dark brown.

Length, head and body 3″·5, tail 1″·3, head 1″·15, ear (anteriorly) 0″·8, tragus 0″·25, forearm 2″·9, thumb 0″·5; second finger —metacarp. 2″·75, 1st phal. 1″·15, 2nd phal. 1″·2; fourth finger —metacarp. 1″·5, 1st phal. 0″·75, 2nd phal. 0″·4; tibia 1″·2, foot and claws 0″·7, calcaneum 0″·9.

Hab. Peninsula of India (Eastern Bengal, Madras); Ceylon; Tenasserim Provinces.

6. Taphozous affinis.

Taphozous affinis, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 232.

In general structure agreeing very closely with *T. saccolaimus*, but distinguished by the margins of the gular pouch in the female being alone developed, and by the very different colour of the fur.

The fur is black above, the bases of the hairs white; beneath wholly pure silky white, as in *Vesperugo temminckii*. The integument of the back is white; the antebrachial and interfemoral membranes and that portion of the wing-membrane between the humerus and the leg black; the wing-membrane between the forearm and third finger is white, while that portion between the third and first fingers is black, mottled with white along the third finger; beneath, the wing-membrane is pure white from the sides of the body outwards as far as the third finger, beyond which it is coloured as the corresponding part above.

Measurements of an adult female, the largest of four preserved in alcohol:—length, head and body 3″·4, tail 1″·1, head 1″·15, ear 0″·9,

tragus 0″·25, forearm 2″·9, thumb 0″·5; second finger—metacarp. 2″·8, 1st phal. 1″·2; fourth finger 2″·5, tibia 1″, foot and claws 0′·6.

Hab. Labuan.

Type in the collection of the British Museum.

Fig. *a*.

RHINOPOMA.

Rhinopoma, *Geoffroy, Descript. de l'Eyypte*, ii. p. 123 (1812); *Gray, P. Z. S.* 1866, p. 82.

Crown of the head slightly elevated above the face-line; muzzle thick, obtuse, the extremity projecting considerably beyond the lower lip; nostrils valvular*, in the anterior margin of a rudimentary nose-leaf; ears united across the forehead, which is marked by a deep concavity, as in *Taphozous*, between the eyes; tragus distinct; *index finger with two phalanges*; tail slender, produced considerably beyond the truncated interfemoral membrane.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors rudimentary, suspended in the small premaxillary bones, which meet in the centre and are connected laterally by slender processes, as in *Emballonura*, with the maxillary bones. Nasal bones much expanded laterally and vertically, while posteriorly the frontal bones are depressed, forming a shallow concavity in the forehead.

Range. From Burma, through the Indian peninsula, to Palestine and Egypt, and probably generally distributed throughout Africa.

Rhinopoma microphyllum.

Rhinopoma microphyllus, *Geoffroy, Descript. de l'Egypte*, ii. p. 123 (1812).

Extremity of the muzzle thick, obtuse, obliquely truncated, projecting considerably beyond the lower lip; nasal apertures consisting of transverse valvular slits; nose-leaf very small, upper margin

* Of *Rhinopoma hardwickii* Sir Walter Elliot remarks:—"The nostrils are placed in the truncated plane of the muzzle, being covered with a membrane slit transversely, and with a small round puncture in the middle of the slit. By means of this apparatus the animal is enabled to open or shut its nostrils at pleasure" (Catalogue of Mammals in the South Mahratta Country, p. 6: Madras, 1840).

convex, with a small raphe passing downwards between the nostrils; forehead with a deep circular concavity between the eyes, from which a narrow groove passes forwards along the centre of the muzzle to the base of the nose-leaf. Ears shorter than the head; laid forwards the tips do not reach as far as the posterior margin of the nose-leaf; inner and outer margins slightly convex, the outer margin straight for a short distance immediately beneath the tip, extremity rounded off; the lower third of the inner margin of the conch connected by a deep band arising immediately behind the frontal depression; outer margin ending between the base of the tragus and the angle of the mouth, not forming a separate lobule near its termination: tragus longer than wide, reaching its greatest width about the middle of the inner margin; extremity obtuse, indistinctly and irregularly toothed, inner margin straight or slightly concave, outer margin convex; at the base a small triangular lobule.

Metacarpal bones of the index and of the second fingers equal in length; metacarpal bone of the fourth finger shorter than the second, but longer than the metacarpal of the third finger. First phalanx of the middle finger imperfectly flexed backwards (in repose) upon the dorsal surface of the metacarpal bone.

Tibia very long and straight, fibula very slender; feet long and slender, the first toe equal to the middle toe in length, as in *Taphozous*; wing-membrane from the lower third of the tibia; calcaneum feeble; interfemoral membrane very short, perforated close to its concave free margin by the long slender tail, which is produced beyond it to a distance equal to the length of the forearm.

The face is almost quite naked; the margin of the upper lip is fringed with a few fine hairs, which are most dense on the truncated extremity of the muzzle, margining the upper edge of a triangular slightly concave space intervening between the margin of the upper lip and the end of the muzzle above. On the back the fur is very short, and strictly limited to it, not extending upon the wing- or interfemoral membrane, and leaving a considerable portion of the

Fig. *b*.

Fig. *c*.

posterior part of the back naked. The skin of this part and of the wings near the body is covered with transverse and longitudinal

wrinkles, as in *Taphozous nudiventris* and in *Cheiromeles torquatus*. The distribution of the fur beneath is somewhat similar; but a few fine hairs appear upon the wing-membrane near the body and upon the wings and forearm; the remainder of the wings is quite naked. The extremity of the tail has a few long hairs, as in *Taphozous*, and also the backs of the terminal phalanges of the feet.

The nasal bones are much expanded laterally, forming round prominent projections above the infraorbital foramen on each side (fig. *a*); immediately behind the frontal is slightly concave; there are no postorbital processes; zygomatic arches extremely slender; bony palate very short, scarcely extending in the middle line as far back as the last molar; roof of the mesopterygoid fossa continuous with the basisphenoid and the basioccipital (figs. *b*, *c*)*.

Premaxillary bones very slender, forming a commissure in the middle line, each bone supporting on its outer side an extremely slender incisor, which is directed outwards and downwards towards the canine of the same side. The single upper premolar exceeds the molars in vertical extent, with a second vertical basal cusp on its outer and anterior side; last upper molar less than half the antepenultimate molar.

Hab. Africa; probably distributed generally throughout the tropical and subtropical regions of that continent.

Subsp. *a*. **Rhinopoma hardwickii.**

Rhinopoma Hardwickii, *Gray, Zool. Miscell.* 1831, p. 37; *Blyth, J. A. S. B.* xiii. p. 492; *Catal. Mammals of Burma*, 1875, p. ; *Jerdon, Mamm. of India*, p. 29 (1867); *Dobson, J. A. S. B.* 1872, p. 211.

Vespertilio (Rhinopoma) hardwickii, *Elliot, Cat. Mammals in the South Mahratta Country*, p. 6 (Madras, 1840).

This is the Asiatic form of *R. microphyllum*; and I am unable to find any permanent structural difference of sufficient importance to lead me to consider it a distinct species. Compared with specimens of *R. microphyllum* from Egypt, I find that it differs only in being larger, in the proportionally shorter tibia and tail, and in the much shorter fur of the back, which does not extend in the least degree upon the membranes.

Hab. Burma; Indian peninsula generally; Asia Minor (Palestine).

Of this species Jerdon remarks:—"This Bat is found over almost all India, in Burmah and Malayana. It frequents old ruins, caves, clefts in rocks, &c. In 1848 many were captured in Madras by Mr. Elliot and myself, in a house, for three successive nights, this Bat being not of common occurrence there in general. They had probably been blown there by the strong westerly winds which had just set in from the rocky hills to the westward of Madras"†.

Measurements of adult specimens of *R. microphyllum* and of *R. hardwickii* respectively are shown in the following Table:—

* Figs. *a*, *b*, *c* have been drawn from a skeleton of *R. hardwickii*, Gray, which I consider a subspecies only of *R. microphyllum*.

† Mammals of India, p. 30 (1867).

		in.	in.
Length, head and body		2·2	3·0
,,	tail	2·7	2·35
,,	tail, free from membrane	2·2	1·65
,,	head	0·7	1·05
,,	ear	0·7	0·85
,,	tragus	0·3	0·3
,,	forearm	2·1	2·6
,,	thumb	0·38	0·5
,,	second finger	2·35	3·0
,,	,, ,, metacarp.	1·35	1·8
,,	,, ,, 1st ph.	0·35	0·45
,,	,, ,, 2nd ph.	0·65	0·8
,,	third finger	2·0	2·5
,,	,, ,, metacarp.	1·15	1·45
,,	,, ,, 1st ph.	0·45	0·6
,,	,, ,, 2nd ph.	0·38	0·45
,,	fourth finger	2·1	2·55
,,	,, ,, metacarp.	1·3	1·7
,,	,, ,, 1st ph.	0·35	0·45
,,	,, ,, 2nd ph.	0·35	0·4
,,	tibia	0·9	1·05
,,	foot and claws	0·5	0·7

CHEIROMELES.

Cheiromeles, *Horsfield, Zool. Researches in Java,* 1824; *Temminck, Monogr. Mammal.* ii. p. 345.

Ears separate, tragus small; extremity of the muzzle projecting considerably beyond the lower jaw, as in *Nyctinomus*; lips smooth, not wrinkled; first phalanx of the middle finger folded (in repose) on the dorsum of the metacarpal bone; legs short; fibula strong, as in *Nyctinomus*; first and outer toe much larger than the others, and separable from them; tail thick, produced beyond the truncated interfemoral membrane.

Dentition. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, conjoined, supporting two strong incisors.

The single species, *C. torquatus*, Horsf., on which this genus has been founded appears to be more closely allied to the American genus *Molossus* than to *Nyctinomus*, which inhabits the same countries with it.

Cheiromeles torquatus.

Cheiromeles torquatus, *Horsfield, Zool. Researches in Java,* pl.
Dysopes cheiropus, *Temm. Monogr. Mammal.* i. p. 218, pl. 17.
Cheiromeles caudatus, *Temm. Monogr. Mammal.* ii. p. 348, pl. 66.
Chiromeles caudatus *et* torquatus, *Wagner, Suppl. Schreb. Säugeth.* v. pp. 700, 701.

Ears triangular, with narrowly rounded tips; the inner margin of the ear-conch papillate along upper half, as in some species of *Taphozous*, outer margin terminating in a distinct round lobe; tragus very small, the inner margin not developed, the outer with

a small projection near the base. Muzzle long, the extremity projecting considerably beyond the lower jaw; lips smooth, without vertical wrinkles. An enormous gular sac extends round half the neck, the interior margin of its mouth on a level with the front of the sternum. Into this sac the oily secretion of glands situated between the internal origins of the pectoral muscles is discharged, in males by a series of small pores collected in two circular slightly elevated patches, in females by a single large orifice.

First toe much larger than the other toes, very thick, thinly covered with long hairs on the outer side, as in the species of *Nyctinomus*. This toe is separated from the other toes like a thumb, and is probably opposable to them. The inner toe is not enlarged similarly, as in the other genera of the subfamily to which this species belongs. Wing-membrane from the middle of the tibia and from the back near the spine. A deep axillary pouch is formed, in both male and female, by an extension of the thick integument covering the breast and sides of the body to the under surface of the humerus, and, longitudinally, to the femur. In the anterior part of this pouch, on the side of the body, behind the axilla, the mamma is placed. Tail very thick and long, projecting more than half its length beyond the short interfemoral membrane.

Integument very thick and almost quite naked, with strong plications along lines of flexure and extension; the back is quite naked; but a collar of very short thinly spread hairs nearly surrounds the neck; a few very short straight hairs appear upon the interfemoral membrane, and clothe the under surface of the body. A few long fine hairs appear at intervals upon the face and lips.

The upper incisors are stout, placed close together, their extremities converging inwards; the single upper premolar is large and tricuspidate; the first lower premolar is minute, and wedged in the space between the canine and the second premolar, which are close together; the last upper molar is less than half the size of the second molar.

Length (of an adult ♂ preserved in alcohol), head and body 5″·3, tail 2″·6, head 1″·6, ear 1″·8, tragus 0″·15, forearm 3″·1, thumb 0″·8, second finger 7″, third finger 5″·6, fourth finger 3″·1, tibia 1″·4, foot and claws 1″·05.

Hab. Malay peninsula (Singapore); Sumatra; Java; Borneo.

Dr. S. Müller remarks* that "this species is distinguished from the rest of the family not only by its disgusting exterior and the nakedness of its body, but chiefly by a most offensive and nauseous odour which emanates from it. This odour is caused by a soft greasy substance, secreted in a small sinus situate in a transverse fold of the skin above the thorax. It is so pungent and offensive that M. Van Oort, while employed in making a drawing of an individual, was afflicted with headache and nausea so severe that he could only with difficulty complete his task."

* Müller, 'Verhandl. over Nat. Gesch. Tafel der Zoogdieren,' quoted by Horsfield, Cat. Mammals Mus. E.-India Comp. p. 42 (1851).

Nyctinomus cestonii.

NYCTINOMUS.

Nyctinomus, *Geoffroy, Descript. de l'Egypte*, ii. p. 128 (1812).

Muzzle thick, the upper extremity obliquely truncated and projecting considerably beyond the lower jaw; extremity of the nose prominent and broad, the margins sharply defined; the nasal apertures circular, directed forwards and downwards; the upper lip very lax, generally marked by vertical wrinkles. Ears of very thick skin, more or less united on the forehead or on the muzzle in front of the eyes, broad, expanded above; tragus distinct, often very small and quadrate, but never reduced to a mere point as in *Molossus*.

Middle finger much longer than any of the others, its metacarpal bone equal to the whole length of the fourth finger, the first phalanx folding backwards (in repose) upon the dorsal surface of the metacarpal. Legs short and strong, tibia and fibula well developed; outer and inner toes much thicker than the others, and fringed with long hairs. Wing-membrane from the ankles, or from the legs higher up, with a connecting band passing across the leg to the interfemoral membrane.

Dentition. Inc. $\frac{2}{6}$ or $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, p.m. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Range. Tropical and subtropical regions of both the eastern and western hemispheres.

Synopsis of Subgenera and Species.*

A. Ears close together in front, their inner margins having a common point of origin upon the forehead; tragus expanded and rounded off above; incisors $\frac{2}{4}$ ..... Subgenus *Dinops*, Dobson.

a. Inner margins of the ears arising near the extremity of the muzzle .... 1. *N. cestonii*, Savi, p. 180.

b. Inner margins of the ears arising from the forehead..... 2. *N. tragatus*, Dobson, p. 181.

B. Ears conjoined at the base of their

* Of Asiatic species only.

inner margins; tragus very small, quadrate; incisors $\frac{2}{4}$ ..... Subgenus *Dysopes*, Dobson.

c. The small first upper premolar stands in the tooth-row ..... 3. *N. plicatus*, B.-H., p. 182.

d. The small first upper premolar external to the tooth-row or absent (deciduous) ..... 4. *N. mops*, F. Cuv., p. 182.

C. Ears connected in front by a deep band produced upwards, and posteriorly by a second band enclosing a hollow naked space between, on the crown of the head; tragus small, quadrate. Subgenus *Chærephon*, Dobson. 5. *N. johorensis*, Dobson, p. 183.

1. Nyctinomus cestonii.

Dinops cestonii, *Savi*, *Nuov. Giorn. di Lett.* p. 230 (1825); *Bullet. des Sci. Nat.* viii. p. 286; *Temminck*, *Monogr. Mammal.* i. p. 262 (1835); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 305.

Dysopes rüppellii, *Temm. Monogr. Mammal.* ii. p. 224.

Dysopes cestonii, *Wagner*, *Suppl. Schreb. Säugeth.* v. p. 702 (1855).

Nyctinomus insignis*, *Blyth*, *Cat. Mamm. Mus. Asiat. Soc. Beng.* (1863).

Dysopes (Molossus) rüppellii, *Swinhoe*, *P. Z. S.* 1870, p. 619.

Nyctinomus cestonii, *Dobson*, *J. A. S. B.* 1874, p. 142.

Ears united by the bases of their inner margins on the muzzle at a short distance from the extremity of the nose, their round superior margins projecting slightly beyond the end of the muzzle; tragus broad, rounded above, half concealed by the large antitragus; inner side of the conch forming a deep thick cutaneous keel concealing the eye. Upper lip very lax, with well-marked vertical wrinkles (see fig., p. 179). Males with a well-developed glandular sac, opening in the centre of the inferior surface of the neck by a circular orifice concealed by the fur.

Thumb short, with a small claw, the base with a large circular callosity.

Metacarpal bone of the middle finger equal to the index finger in length, and slightly longer than the metacarpal of the third finger, but nearly double the length of the fourth metacarpal.

Feet small; both the outer and inner toes fringed with long hairs, which are longest on the inner toe. Wing-membrane from the lower third of the tibia. Tail extending about half its length beyond the interfemoral membrane.

The distribution of the fur in this species scarcely differs from that in the other species of the genus; and a description of one will suffice for all.

The fur of the back is not long, but very fine and dense, and extends outwards almost as far as a line drawn from the middle of the humerus to the knee, and triangularly upon the interfemoral for a short distance; the antebrachial membrane is covered with short

* The figure of the head of *N. cestonii* on p. 179 has been drawn from the type of *N. insignis*.

fur; the forearm, the legs, and the remainder o the wings naked. Beneath, the fur extends outwards to a less distance, ending by an abrupt, well-defined, straight margin; the antebrachial membrane is naked. The lower margin of the upper lip is fringed with fine hairs; the face is almost naked; a few short hairs form a semicircle on the inner side of the ear-conch; and the cutaneous band connecting the inner sides of the ears to the muzzle is clothed with erect hairs.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

The upper incisors are separated by a space in the centre, their single cusps directed inwards and slightly forwards; lower central pair of incisors in front of next two, which touch the small incisors on each side next the canines, but do not overlap them*; first upper premolar minute, acutely pointed, in the centre of the space between the canine and second large premolar.

Length, head and body 3″·25, tail 2″·1, tail free beyond membrane 1″·1, head 1″·1, ear 1″·15 × 0″·85, tragus 0″·25 × 0″·2, forearm 2″·3, thumb 0″·35; second finger—metacarp. 2″·1, 1st phal. 0″·9, 2nd phal. 1″·05; fourth finger 2″·1; tibia 0″·65, foot and claws 0″·4.

Hab. China (Amoy); Europe (south of the Alps); Africa.

On the habits of a species of the genus to which this species belongs, most probably this very species, Mr. Swinhoe remarks:—"One that I kept alive had a curious habit of pushing its eye almost out of the socket when disturbed, as if to get a better view of the cause of its annoyance. When tranquil again, the eye would sink right in and almost disappear. The skin of the tail in this genus slides up and down the tail-bone, by this means folding and unfolding the interfemoral membrane"†.

2. Nyctinomus tragatus.

Nyctinomus tragatus, *Dobson, J. A. S. B.* 1874, p. 143.

Ears and tragus as in *N. cestonii*, the inner margins of the ear-conch close together on the forehead, but not conjoined by a band and not arising so near the extremity of the muzzle as in *N. cestonii*.

Wing-membrane from the ankles; calcaneum terminating in a lobule, free portion of the tail shorter than in *N. plicatus*.

This species, though so very well distinguished from *N. plicatus* by the above-mentioned characters, resembles that species very closely in general aspect; and the measurements of the different parts correspond so closely that on a superficial examination it may be confounded with it.

Measurements of an adult female specimen preserved in alcohol:—Length, head and body 2″·9, tail 1″·7, tail free from membrane 0″·85, ear 0″·9, tragus 0″·23 × 0″·15, forearm 2″, second finger 3″·6, fourth finger 1″·9, tibia 0″·6, foot and claws 0″·35.

* Blasius (Wiegm. Archiv, 1839, p. 304) gives the number of lower incisors, incorrectly, as four.

† P. Z. S. 1862, p. 357.

Hab. Peninsula of India (Rajanpur, N.W. Frontier; Jashpur, near Chutia Nagpur; Calcutta).

Type in the collection of the Indian Museum.

3. Nyctinomus plicatus.

Vespertilio plicatus, *Buchanan-Hamilton, Trans. Linn. Soc.* 1800, v. p. 261, fig.
Nyctinomus bengalensis, *Geoffroy, Descr. de l'Egypte*, ii. p. 130.
Nyctinomus tenuis *et* dilatatus, *Horsfield, Zool. Researches in Java* (1825); *Cantor, J. A. S. B.* xv. p. 179.
Dysopes murinus, *Gray, Illustr. Ind. Zool.* (figured) 1830.
Dysopes plicatus, *Temm. Monogr. Mammal.* i. p. 223.
Dysopes tenuis, *Temm. l. c.* p. 228.
Nyctinomus plicatus, *Jerdon, Mammals of India*, p. 33 (1867); *Dobson, J. A. S. B.* 1874, p. 143.

Muzzle broad and thick, the upper lip pendulous, overhanging the lower, marked by vertical wrinkles; extremity projecting considerably beyond the end of the lower jaw; ears large, quadrilateral, conjoined at the base of their inner margins in front of the orbits, forming an obtuse, slightly elevated, angular projection on the muzzle; outer margin terminating in a well-defined antitragus; tragus small, quadrilateral, superior margin slightly concave. Lower part of the legs free from the wing-membrane, which, however, is connected with the ankle by a strong raphé passing along the tibia.

Fur very dense and soft, above bluish black or smoky black, beneath somewhat paler.

First upper premolar small, in the space between the canine and the second large premolar.

Length (of an adult ♂ specimen), head and body 2″·9, tail 1″·7, tail free from membrane 1″·1, ear 0″·9, tragus 0″·1 × 0″·03, forearm 1″·95, second finger 3″·9, fourth finger 1″·7, tibia 0″·7, foot and claws 0″·35.

Hab. Peninsula of India (Calcutta; Ludiana; Agra; Madras), Sumatra, Java, Borneo.

This Bat is common along the eastern coast of the peninsula of India.

4. Nyctinomus mops.

Dysopes mops, *F. Cuvier, Dents des Mammif.* p. 49 (1825).
Mops indicus, *Lesson, Nouv. Tabl. du Règne Anim. Mam.* p. 18 (1842); *Peters, MB. Akad. Berl.* 1869, p. 402.

This species resembles *N. plicatus* generally, agreeing with it in the form of the head and ears, of the body and extremities, and even in the measurements. It is distinguished by the dentition and by the position of attachment of the wing-membrane.

The wing-membrane is attached posteriorly to the upper third of the tibiæ. The upper canine and second upper premolar are close together; and in the outer angle between them the first very small premolar is placed.

Length (of the type specimen, an adult ♀ preserved in alcohol), head and body 3″, tail 1″·5, ear 0″·95, tragus 0″·1, forearm 1″·8, thumb 0″·4, second finger 3″·5, fourth finger 1″·8, tibia 0″·7, foot and claws 0″·45.

Hab. Sumatra.

Type in the collection of the Paris Museum.

Dr. Peters (*l. c.*) first pointed out the position of this species, which cannot be separated from the genus *Nyctinomus*. *Nyctinomus angolensis*, Peters, from S.W. Africa, has the first upper premolar similarly placed, but is at once distinguished by the shortness of its ears from *N. mops*.

Fig. *a*.

5. Nyctinomus johorensis.

Molossus (Nyctinomus) johorensis, *Dobson, P. A. S. B.* Jan. 1873.

Ears large, circular, as in *N. plicatus*, Buch.-Ham., united in front; antitragus large, separated from the outer margin by a deep concavity; tragus very small, square, superior margin slightly concave. In front, the inner sides of the ears are connected by a fold of integument passing forwards on the muzzle as far as a point placed midway between the eyes and the extremity of the nostrils. This connecting-band is continued upwards and backwards, between the ears, to a height of 0·4 inch, forming a small funnel open behind, wide below, and narrow above. At a distance of about 0·3 inch from the anterior connecting-band the ears are again connected by a second fold of skin posterior and parallel to the first, about 0·1 inch in vertical height (fig. *a*). Between these two connecting-folds of integument and the sides of the ears a hollow square is contained. This concavity is empty and open only from above. At the base of the funnel-shaped anterior boundary a few long hairs exist, similar to those found at the bottom of the frontal sac of some species of Phyllorhine Bats. The remaining portions of the cell and its boundaries are naked.

The animals of this genus possess the power of folding the ear-conch forwards, downwards, and outwards, thus closing the external ear. When the ears are closed the funnel-shaped portion of integument connecting them in front, in this species, is drawn forwards, disclosing the cavity behind. In the erect condition of the ears the same

funnel-shaped projection is drawn backwards across this square hollow cavity, which it covers, as the pitcher of *Nepenthes* is covered by the leaf forming its lid. In this position the extremity of the funnel is flattened out, and lies in the space contained between the posterior connecting-band and the top of the head.

In other respects this species resembles *N. plicatus* very closely. The thumb is longer than in most species of the genus; and the wing-membrane is attached a short distance below the knee-joint.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

The upper incisors are placed in the centre of the space between the canines, and are separated by a very narrow interval from each other.

Length, head and body 2″·8, tail 1″·7, tail free from interfemoral membrane 1″, ear 0″·9, tragus 0″·1, forearm 1″·9, thumb 0″·5, second finger 3″·6, fourth finger 1″·8, tibia 0″·7, foot and claws 0″·4.

Hab. Malay peninsula (Johore).

Type in the collection of the Indian Museum, Calcutta.

The only specimen of this very remarkable species yet obtained, an adult ♂, was taken at Johore, in the southern extremity of the Malay peninsula, by Mr. James Meldrum.

Harpiocephalus cyclotis.

APPENDIX.

A.

In the "Synopsis of Groups of Allied Genera" (pp. 5–7) the short definition prefixed to each group does not contain the special characters of the group, but is intended to express such only as may be found generally in all the genera. The special characters of each group must be sought for in the natural affinities of the different genera with a genus which is considered typical of the group; and the name of the genus considered typical may be inferred from the name of the group. Thus the genus *Plecotus* may be considered typical of the *Plecoti*, and *Vespertilio* of the *Vespertiliones*. In considering the natural affinities of the genera, I have taken into account the general agreement of all the natural characters, taken together, of each genus with the characters of the typical genus; and the agreement of some special characters in genera belonging to different but allied groups* does not, in my opinion, affect the natural position of these groups; for, if certain characters in each genus were alone taken into account, it would be necessary to unite in one some families of Chiroptera.

B.

To list of synonyms of *Vesperugo maurus* (p. 99), add *Scotophilus darwini*, Tomes (P. Z. S. 1859, p. 70), from Palma, Canary Islands.

C.

The following description of a species of *Kerivoula* was accidentally omitted when describing the Asiatic species of that genus at pp. 145–150:—

Kerivoula jagorii.

Vespertilio (Kerivoula) jagorii, *Peters, MB. Akad. Berl.* 1866, p. 399.

Ears as in *K. hardwickii*; but there is a second slight concavity

* Dr. Peters has pointed out the close resemblance of the skull and teeth of *Histiotus velatus* (of the group *Plecoti*) to those of *Vesperugo* (*Vesperus*) *montanus* (of the group *Vespertiliones*) (MB. Akad. Berl. 1875, p. 792, pl. 1. figs. 1–5).

about the middle of the outer margin; inner margin very convex, projecting beyond the eye: tragus rather broad below, tapering to an acute point and curved outwards; immediately above the base a deep but narrow notch opposite the base of the inner margin. Nostrils close together, the extremity of the muzzle projecting.

Tip of the tail projecting slightly; margin of the interfemoral membrane not fringed with hairs; wing-membrane from the base of the toes. Fur similar in colour to that of *K. hardwickii*.

Upper inner incisor long and unicuspidate; outer incisor very short, not half the length of the inner incisor; upper premolars nearly equal in vertical extent.

Length, head and body 1″·95, tail 1″·9, head 0″·75, ear 0″·6, tragus 0″·4, forearm 1″·55, thumb 0″·37, second finger 3″·2, fourth finger 2″·25, tibia 0″·65, foot and claws 0″·35.

Hab. Philippine Islands (Samar Island). Type in the Berlin Museum.

D.

Scotophilus pallidus, n. sp.

Head and muzzle as in *S. temminckii*. Ears slightly shorter than the head; the internal basal lobe convex, evenly rounded; the ascending inner margin slightly convex; tip rather broadly rounded off; the outer margin straight for half its length, concave opposite the base of the tragus, and terminating in a convex lobe: tragus moderately long and rounded at the tip, not attenuated above; anterior surface smooth; inner margin straight, outer slightly convex, a prominent triangular lobule near the base.

Wing-membrane from the base of the toes; calcaneum weak; postcalcaneal lobule very narrow and long; last rudimentary caudal vertebra free.

Teeth as in *S. temminckii*.

Fur, integuments of the body, wings, and interfemoral membrane pale buff throughout*.

Length (of an apparently adult ♀, preserved in alcohol), head and body 2″, tail 1″·4, head 0″·7, ear 0″·6, tragus 0″·23 × 0″·08, forearm 1″·4, thumb 0″·25, second finger 2″·45, fourth finger 1″·85, tibia 0″·48, foot and claws 0″·28.

Hab. India (Mian Mir, near Lahore).

Type in the collection of the Indian Museum, presented by Dr. J. S. Gunn, Her Majesty's Indian Medical Service.

* The very pale colour of the fur, approaching white, in the specimen from which the description of this species has been taken, might lead one to believe that it is an example of an albino. The iris, however, is quite black; and I think it more probable that this specimen represents the normal colour of individuals inhabiting the sandy plains of the Panjab, agreeing in this respect with *Vesperugo serotinus*, *V. kuhlii*, *V. pipistrellus*, and other species of Bats, which, in common with many species of other orders of Mammals and Birds, appear to vary in the general colour of their coverings according to the humidity of the countries inhabited by them, the dwellers in dry sandy plains imitating, as it were, the prevailing light colour of the ground.

CATALOGUE OF SPECIMENS

OF THE

SPECIES OF CHIROPTERA

IN THE

COLLECTION OF THE INDIAN MUSEUM,

AND

INDEX TO THE SPECIES DESCRIBED.

Order

Suborder I.

No.	Name.	Locality.	Date.
1	**Pteropus medius,** *Temm.*	Calcutta	1842–43
2	" " "	"	1842–43
3	" " "	"	1842–43
4	" " "	"	1842–43
5	" " "	"	1842–43
6	" " "	"	1842–43
7	" " "	"	1842–43
8	" " "	"	1842–43
9	" " " ♂	"	1866
10	" " " ♂♀	India, Calcutta	.....
11	" " " ♂♀	Cachar	1867
12	" " " ♂♀	Maunbhoom	1868
13	" " " ♂♀	"	1868
14	" " " ♂♀	Chutia Nagpur	1870
15	" " " ♂♀	Calcutta	1872
16	" " " ♂♀	Pegu	1873
17	**P. medius,** var. **assamensis,** *McClelland,* ♂	Sibsagar, Assam	1872
18	**P. nicobaricus,** *Fitz. & Zeleb.,* ♀	Java	.....
19	" "	Nicobars	1846
20	" "	"	1846
21	" " ♂	South Andaman	1863
22	" "	"	1864
23	" "	"	1864
24	" "	"	1864
25	" " ♀	"	1871
26	" " ♂	"	1872
27	" " ♀	"	1872
28	" " ♂	Nicobars	1872
29	" " ♀	Andaman	1872
30	**P. edulis,** *Geoff.*	Java	1845
31	" "	"	1845
32	" "	"	1845
33	" "	Tenasserim	1839
34	**P. poliocephalus,** *Temm.*	Australia	1846
	P. dasymallus, *Temm.*	Kiousiou Island, Japan..	.....
	P. jubatus, *Eschsch.*	Luzon, Philippine Islands	.....

* The unnumbered specific names refer to Asiatic Chiroptera not yet

CHIROPTERA*.

MEGACHIROPTERA.

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
1	.....	Dried skin	.....	51 A	18
2	.....	,,	.....	51 B	
3	.....	,,	.....	51 C	
4	.....	,,	.....	51 D	
5	.....	,,	.....	51 E	
6	.....	,,	.....	51 F	
7	.....	,,	.....	51 G	
8	.....	,,	.....	51 H	
9	Dr. J. Anderson.....	Skeleton...	Perfect; prepared in 1872.		
10	Unknown	In spirit...			
11	Museum Collector...	Dried skin			
12	Do.	,,			
13	Do.	,,			
14	V. Ball, Esq.	Skull			
15	Mr. O. L. Fraser....	In spirit...			
16	W. Theobald, Esq....	,,			
17	S. E. Peal, Esq.....	,,	Back of head and neck pale straw colour, nearly white; fur very long, especially round the neck; ears rather less pointed than in the common flying-fox of the plains.		
18	.....	Dried skin	Has a small label with word "Java" tied to its foot; not mentioned in Blyth's catalogue.	...	17
19	Captain Lewis	,,			
20	Do.	,,			
21	Lieut.-Col. Tytler....	In spirit...	Adult male; nape of neck bright yellow.		
22	Do.	Dried skin	Labelled *P. tytleri*, n. s.		
23	Do.	,,	Do. do.		
24	Do.	,,	Do. do.		
25	J. Homfray, Esq.....	In spirit...	Adult female; fur intensely black throughout.		
26	Do.	,,	Adult male; nape pale yellowish brown.		
27	G. E. Dobson, M.B....	,,	Adult female; nape dark ferruginous brown.		
28	J. Homfray, Esq.....	Skeleton & skin in spirit.	Old male; nape reddish brown, with shining tips.		
29	Do.	,,	Young female; nape ferruginous brown.		
30	Batavian Society.....	Dried skin	.....	53 A	20
31	Do.	...	.....	53 B	
32	Do.	Dried skin	.....	53 C	
33	Dr. Helfer	,,	A specimen of an immature individual of some species of *Pteropus*, identified by Blyth with *P. edulis*.		
34	Sydney Institution...	,,	.....	50 A	
...	.....	...	.....	...	16
...	.....	...	.....	...	21

represented in the collection, but of which descriptions are given.

No.	Name.	Locality.	Date.
35	**Cynonycteris minor**, *Dobson*	.....	1845
36	**C. amplexicaudata**, *Geoff.*	Coromandel coast	1846
37	" "	Ceylon	1851
38	" " ♀	Singbhoom	1870
39	" " ♀	Pegu	1872
40	" " ♂	Kishm Island, Persian Gulf.	1872
40*a*	" "	Luzon, Philippine Islands	1873
41	**C. collaris**, *Illiger*	South Africa	1859
42	**Cynopterus marginatus**, *Geoff.*	Calcutta	1841–51
43	" " "	"	1841–51
44	" " "	"	1841–51
45	" " "	"	1841–51
46	" " "	"	1841–51
47	" " "	"	1841–51
48	" " "	"	1841–51
49	" " " ♂	"	1845
50	" " " ♀	"	1845
51	" " "	Malacca	1845
52	" " "	"	1845
53	" " "	Java	1845
54	" " "	"	.....
55	" " "	Ceylon	.....
56	" " " ♀	"	.....
57	" " " ♂	"	.....
58	" " " ♂	Darjeeling	1866
59	" " " ♀	"	1866
60	" " " ♀	Cachar	1868
61	" " "	"	1868
62	" " " ♀	Calcutta	1869
63	" " " ♂	Cherra Punji	1872
63*a*	" " " ♂	Bhamo, Yunan	1874
	C. melanocephalus	Java	.....
64	**C. scherzeri**, *Fitz. & Zeleb.*	Car-Nicobar	1873
65	" "	"	1873
66	**C. brachyotus**, *Müller*	Andamans	1864
67	" "	"	1864
68	" "	"	1864
69	" "	"	1864
70	" "	"	1864
71	" " ♀	"	1872
72	" " ♂	"	1872
73	" " ♀	"	1872
74	" " ♀	"	1872
75	**C. brachysoma**, *Dobson*	"	1871
	C. (Ptenochirus) jagorii, *Ptrs.*	Luzon, Philippine Islands	.....
	C. (Megærops) ecaudatus, *Temm.*	Sumatra	.....
76	**Macroglossus minimus**, *Geoff.*	.....	.....
77	" "	Darjeeling	1871
78	**Eonycteris spelæa**, *Dobson*, ♀	Farm caves, Moulmein	1871
79	" " "	"	1872
80	" " "	"	1872
81	" " "	"	1872
82	" " " ♂	"	1872

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
35	Batavian Society.....	Dried skin	(Type.)	55 A	32
36	Sir W. Elliot.....	,,	.....	54 A	
37	Dr. Kelaart	,,	*Pteropus seminudus*, Kelaart. (Type.).....	54 B	
38	V. Ball, Esq.....	In spirit	.....	...	29
39	W. Theobald, Esq....	,,			
40	W. T. Blanford, Esq.	,,	Taken in the Nemakdun Salt-caves, Kishm Island.		
40*a*	Berlin Museum.....	...	Received in exchange.		
41	E. L. Layard, Esq....	Dried skin	.....	56 A	
42	.....	,,	.....	58 A	24
43	.....	,,	.....	58 B	
44	.....	,,	.....	58 C	
45	.....	,,	.....	58 D	
46	.....	,,	.....	58 E	
47	.....	,,	.....	58 F	
48	.....	,,	.....	58 G	
49	.....	In spirit	.....	58 J	
50	.....	.....	.....	58 J	
51	Batavian Society ...	Dried skin	.....	58 L	
52	Do.	,,	.....	58 M	
53	Do.	,,	.....	58 N	
54	Do.	,,	.....	58 O	
55	Dr. Kelaart	Skeleton...	Imperfect; lower jaw wanting	58 I	
56	.....	In spirit...	In a bottle labelled 10 *a*.		
57	.....	,,			
58	Dr. J. Anderson ...	,,	Large specimen.		
59	Do.	,,	Do.		
60	Museum Collector...	,,			
61	Do.	Skeleton...	Rough ligamentous skeleton.		
62	Dr. J. Anderson ...	In spirit.			
63	Lieut. Bourne	,,	[footnote.		
63*a*	Dr. J. Anderson ...	...	W. China Exped., 1875. Described in a	...	25
...	.....	...	.....	...	27
64	Dr. Stoliczka.....	,,	} Female with young Bat.	...	26
65	Do.	,,			
66	Lieut.-Col. Tytler ...	,,	} In two bottles.	58 B	
67	Do.	,,			
68	Do.	,,			
69	Do.	,,			
70	Do.	,,			
71	J. Wood-Mason, Esq.	,,			
72	Do.	,,			
73	J. Homfray, Esq. ...	,,			
74	Do.	,,			
75	Dr. Stoliczka.....	,,	(Type.)	...	27
...	.....	...	.....	...	28
...	.....	...	.....	...	29
76	.....	In spirit...	.....	...	34
77	Dr. Stoliczka.....	Dried skin	Of an immature specimen.		
78	Do.	In spirit...	(Type.)	...	33
79	W. Theobald, Esq....	,,			
80	Do.	,,			
81	Do.	,,			
82	Do.	Skeleton...	Perfect skeleton, prepared in 1872.		

No.	Name.	Locality.	Date.
83	**Megaderma lyra,** *Geoff.*	Calcutta	.....
84	,, ,, ,, ...	,, ...	.....
85	,, ,, ,, ...	,, ...	.....
86	,, ,, ,, ...	Ceylon	1852
87	,, ,, ,, ...	,, ...	1852
88	,, ,, ,, ♀	.....	1842
89	,, ,, ,, ♀	.....	1842
90	,, ,, ,, ...	.....	1842
91	,, ,, ,, ...	.....	1842
92	,, ,, ,, ...	.....	1842
93	,, ,, ,, ♂♀	Raneegunge	.....
94	,, ,, ,, ♂♀	,, ...	.....
95	,, ,, ,, ...	Chanda	1867
96	,, ,, ,, ...	,, ...	1867
97	,, ,, ,, ...	,, ...	1867
98	,, ,, ,, ...	,, ...	1867
99	,, ,, ,, ...	Singbhoom	1869
100	,, ,, ,, ...	,, ...	1869
101	,, ,, ,, ♂♀	Unknown	.....
102	,, ,, ,, ...	,, ...	.....
103	,, ,, ,, ♂♂	,, ...	.....
104	,, ,, ,, ♂	Agra	1869
105	,, ,, ,, ♂♂	,, ...	1869
106	,, ,, ,, ♂♀	,, ...	1869
107	,, ,, ,, ♂♀	,, ...	1869
108	,, ,, ,, ♂	,, ...	1869
109	,, ,, ,, ♂	,, ...	1869
110	,, ,, ,, ...	,, ...	1869
111	,, ,, ,, ...	,, ...	1869
112	,, ,, ,, ♂	Sylhet	1870
113	,, ,, ,, ♂	,, ...	1870
114	,, ,, ,, ♂♀	Purneah	1872
115	,, ,, ,, young	,, ...	1872
116	,, ,, ,, young	,, ...	1872
117	,, ,, ,, ♂♂♂♂♂♂	,, ...	1872
118	,, ,, ,, young	,, ...	1872
119	,, ,, ,, ♀♀♀♀♀♀	,, ...	1872
120	,, ,, ,, ...	,, ...	1872
121	,, ,, ,, ...	,, ...	1872
122	,, ,, ,, ...	,, ...	1872
123	,, ,, ,, young	,, ...	1872
124	,, ,, ,, young	,, ...	1872
125	,, ,, ,, ♂♂♂♂♂	,, ...	1872
126	,, ,, ,, ...	Nassick	1872
127	,, ,, ,, ...	,, ...	1872
128	,, ,, ,, ...	,, ...	1872
129	,, ,, ,, ♀♀♀♀♀	,, ...	1872
130	,, ,, ,, ♀	Unknown	.....
131	**M. spasma,** *Geoff.*	Java	1845
132	,, ,, ...	Malacca	1850

MICROCHIROPTERA.

NYCTERIDÆ.

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
83	.....	Dried skin	.....	59 B	78
84	.....	,,	.....	59 C	
85	.....	,,	.....	59 D	
86	Dr. Kelaart	,,	.....	59 E	
87	Do.	,,	.....	59 E	
88	.....	In spirit...	.....	59 F	
89	.....	,,	.....	59 G	
90	.....	,,	.....	59 H	
91	.....	Skeleton ...	Imperfect	59 I	
92	.....	,,	Do. (skull wanting).....	59 J	
93	Purchased	In spirit.			
94	Do.	,,			
95	Museum Collector...	Dried skin.			
96	Do. ...	,,			
97	Do. ...	,,			
98	Do. ...	,,			
99	.....	.....			
00	.....	.....			
01	.....	In spirit.			
02	.....	,,			
03	.....	,, ...	Fœtus.		
04	Riddell Museum ...	,,			
05	Do. ...	,,			
06	Do. ...	,,			
07	Do. ...	,,			
08	Do. ...	,,			
09	Do. ...	,,			
10	Do. ...	Dried skin.			
	Do. ...	,,			
12	Maj. H. H. Godwin-Austen	In spirit.			
	Do.	,,			
	Dr. Anderson.....	,,	Females with young, obtained at the same time and place. Of these Dr. Anderson remarks:—"All the young, even the largest, were adherent to the teats, some attached to the abdominal, and others to the pectoral nipples; but I observed that they moved about with great energy from one teat to another. Besides the specimens collected, I examined about forty other females, and each had only one young."		
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Col. Haughton	,,			
	Do.	,,			
	Do.	,,			
	Do.	,,			
	Unknown	Skeleton ...	Perfect skeleton, prepared in 1872.		
	Batavian Society ...	Dried skin	.....	61 A	79
	Mr. G. Moxon	,,	.....	61 B	

No.	Name.	Locality.	Date.
133	**Megaderma spasma**, *Geoff.*	Malacca	1850
134	" " " ♀	Tenasserim	1855
135	" " " ♂	"	1855
136	**Nycteris javanica**, *Geoff.*	Java	1846
137	" " "	Malacca	1851
138	" " "	"	1851
			Family
139	**Rhinolophus luctus**, *Temm.*	Nipal?	1842
140	" " "	Darjeeling	1852
141	" " "	"	1852
142	" " "	"	1870
143	" " " ♀ & fœtus.	"	1872
	R. trifoliatus, *Temm.*	India, Java, Borneo	.....
144	**R. mitratus**, *Blyth*	Chaibasa	1843
145	" "	"	1843
	R. philippinensis, *Waterh.*	Philippine Islands	.....
146	**R. pearsonii**, *Horsf.*, ♂	Hotha, Yunan	1868
147	" " ♂	"	1868
148	" "	"	1868
149	" "	Tupai Mukh	1872
	R. rufus, *Peters*	Philippine Islands	.....
150	**R. macrotis**, *Hodgson*, ♀	Nipal	1842
151	" " ♂	Masuri	1852
152	" " ♂	"	1852
153	**R. affinis**, *Horsfield*	Ceylon	1852
154	" "	"	1852
155	" "	"	1863
156	" "	"	1852
157	" "	"	1852
158	" "	"	1852
159	" " ♀	"	1852
160	" " ♂	"	1852
161	" " ♀	"	1852
162	" " ♂	Unknown	.....
163	" " ♂	.....	.....
164	" " ♀	.....	.....
165	" " ♀	.....	.....
166	" " ♂	Hotha, Yunan	1868
167	" " ♂	Sylhet	1872
168	" " ♂	"	1872
169	" " ♀	"	1872
170	" " ♂	.....	.....
171	" "	Darjeeling	1870
172	" "	Barrackpore	1852
173	" "	"	1852
174	" "	"	1852
175	**R. andamanensis**, *Dobson*, ♂	Andamans	1870
176	**R. euryotis**, *Temm.*, ♀	Amboina	1870
177	" " ♂		
178	**R. petersii**, *Dobson*, ♂	"	1870
		Unknown	.....

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
133	Mr. G. Moxon	Dried skin	.....	61 C	79
134	W. Theobald, Esq.	In spirit...	*M. horsfieldii* according to Blyth	60 A	
135	Do.	.....	Do.	60 B	
136	Batavian Society ...	Dried skin	.....	82 A	81
137	Mr. G. Moxon	,,	.....	82 B	
138	Do.	Skull	Skull of preceding specimen.		
	HINOLOPHIDÆ.				
39	B. H. Hodgson, Esq.	Skeleton ...	Badly prepared and imperfect	62 C	39
40	Maj. W. S. Sherwill.	Dried skin	In bad condition	62 A	
41	Do.	Skull	Taken from preceding specimen	62 B	
42	Captain Elwes	Dried skin.			
43	J. Gammie, Esq. ...	In spirit...	Adult female with fœtus.		
..	.....	.....	.....	...	41
44	Maj. S. R. Tickell...	Dried skin	.....	63 A	41
45	Do. ...	,,	(Type.)	63 B	
..	.....	.....	.....	...	42
46	Yunan Expedition...	In spirit...	Collected by Dr. Anderson	...	43
47	Do. ...	,,	Do. without skull.		
48	Do. ...	Skull	Skull of preceding.		
49	Looshai Expedition.	Dried skin.			
.	.....	.....	.....	...	44
50	B. H. Hodgson, Esq.	In spirit ...	Fur completely bleached by the spirit ...	70 A	45
51	Captain Hutton.....	,,	Brown	70 B	
52	Do.	,,	.....	70 B	
53	Dr. Kelaart	Dried skin	In very bad condition	67 A	46
54	Do.	.....	Do.	67 B	
55	Do.	.....	Do.	67 C	
56	Do.	.....	Do.	67 D	
57	Do.	.....	Do.	67 E	
58	Do.	.....	Do.	67 F	
59	Do.	In spirit ...	A male and female answer to Kelaart's description of *R. rubidus*; the third, a female, to Horsfield's original description of *R. affinis*.	67 H	
60	Do.	,,			
61	Do.	,,			
62	Unknown	,,	Bottle 99-2 A. Male has terminal portion of posterior nose-leaf very small.		
	.....	,,			
	.....	,,			
	.....	,,	Found in bottle labelled 89 *f*.		
	Yunan Expedition...	,,	Collected by Dr. Anderson.		
	E. B. Baker, Esq. ...	,,			
	Do. ...	,,			
	Do. ...	,,			
	.....	,,	Taken from an unlabelled bottle, old collection.		
	J. Gammie, Esq. ...	Dried skin.			
	Major Tytler	,,	.....	68 A	
	Do.	,,	.....	68 B	
	Do.	,,	.....	68 C	
	J. Homfray, Esq. ...	In spirit...	(Type.)	...	46
	Exchange, Berlin Museum.	,,			
	Do.	,,			
	Unknown	,,	Bottle 375, old collection. (Type.)	...	49

No.	Name.	Locality.	Date.
179	**Rhinolophus petersii**, *Dobson*, ♀	Unknown	.....
180	**R. minor**, *Temm.*, ♀	,,	.....
181	,, ,, ♀	,,	.....
182	,, ,, ?	,,	.....
182*a*	,, ,, ♀	Isagine, Upper Burma	1875
183	**R.** ? ♂	Unknown	.....
184	**R.** ? ♂	,,	.....
185	**R. garoensis**, *Dobson*, ♀	Garo Hills, Assam	1871
186	**R. hipposideros**, *Geoff.*, ♂	Europe	.....
187	,, ,, ♂	,,	.....
188	,, ,, ♀	,,	.....
189	**R. euryale**, *Blasius*, ♀	Pisa, Italy	1872
189*a*	**R. coelophyllus**, *Ptrs.*, ♂	Isagine, Upper Burma	1875
189*b*	,, ,, ♀	,, ,,	1875
190	**R. ferrum-equinum**, *Schr.*, ♀	Europe	.....
191	,, ,, ♂	,,	.....
192	,, ,, ♂	,,	.....
193	,, ,, ♂	Masuri, Himalaya	1852
194	,, ,, ♀	,,	1852
195	,, ,, ♀	Chuari, Chamba, 3000 ft.	1872
196	,, ,,	Europe	1856
197	? ,,	.....	.....
198	**Phyllorhina armigera**, *Hodg.*, ♂	Darjeeling	1852
199	,, ,, ,, ♀	,,	1852
200	,, ,, ,, ♀	Khasia Hills	1870
200*a*	,, ,, ,, ♂	Shillong	1875
200*b*	,, ,, ,, ♀	,,	1875
200*c*	,, ,, ,, ♀	Khasia Hills	1875
200*d*	,, ,, ,, ♀	,,	1875
201	,, ,, ,, ♀	Nipal	1871
202	,, ,, ,, ♀	,,	1871
203	,, ,, ,, ♀	Darjeeling	1871
203*a*	**P. leptophylla**, *Dobson*, ♂	Khasia Hills	1870
204	**P. larvata**, *Horsfield*	Arakan	1842
205	,, ,,	,,	1842
206	,, ,,	,,	1842
207	,, ,,	Sylhet	1853
208	,, ,,	,,	1853
209	,, ,,	,,	1853
210	,, ,, ♂	Goalparah, Assam	1868
211	,, ,, ♀	Prome, Burmah	1868
212	,, ,, ♂	,,	1868
213	,, ,, ♂	,,	1868
214	,, ,, ♂	,,	1868
215	,, ,, ♂	,,	1868
216	,, ,, ♂	,,	1868
217	,, ,, ♀	,,	1868
218	,, ,, ♀	,,	1868
219	,, ,, ♂	,,	1868
220	,, ,, ♂	,,	1868
221	,, ,, ♀	,,	1868

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
179	Unknown	In spirit ...	Bottle 375, old collection. (Type.)	...	49
180	Do.	„	From old collection, found in an unlabelled bottle. One specimen, sex undeterminable, in dilapidated condition.	...	56
181	Do.	„			
182	Do.	„			
182*a*	Dr. J. Anderson ...	„	Western China Expedition.		
183	Unknown	„	From old collection, in dilapidated condition.		
184	Do.	„			
185	Maj. H. H. Godwin-Austen.	„	(Type.)	...	48
186	Hungarian Museum	„	.....	...	53
187	Do.	„			
188	Do.	„			
189	Exchange, Berlin Museum.	„	.....	...	51
189*a*	Dr. J. Anderson ...	„	Western China Expedition	...	54
189*b*	Do. ...	„	Do.		
190	Hungarian Museum	In spirit...	.....	...	54
191	Do.	„			
192	Do.	„			
193	Captain Hutton.....	„	*R. tragatus*, Hodg., according to Blyth.		
194	Do.	„	Do. do.		
195	Capt. W. G. Murray	„			
196	M. Malherbe	Dried skin	.....	72 A	
197	.....	„	Dried specimen in bad condition, perhaps *R. minor*.	65	
198	Major Sherwill	In spirit...	Adult male with large frontal sinus	74 A	64
199	Do.	Dried skin	In bad condition	74 B	
200	Major H. H. Godwin-Austen.	In spirit.			
200*a*	Do.	„	Not quite adult.		
200*b*	Do.	„	Do.		
200*c*	Do.	„	Do.		
200*d*	Do.	„	Very young.		
201	Museum Collector...	„			
202	Do.	„			
203	Captain Elwes	Dried skin	Well preserved skin; frontal sac everted.		
203*a*	Major H. H. Godwin-Austen.	In spirit...	Adult. (Type.).....	...	66
204	Colonel Phayre	„	In bad condition	77 A	
205	Do.	„	Do.	77 B	
206	Do.	„	Do.	77 C	
207	F. Skipwith	„	Do. with skull separate.....	77 D	
208	Do.	„	.....	77 F	
209	Do.	„	.....	77 G	
210	H. L. Houghton, Esq.	In spirit...	Cinnamon-brown.		
211	Yunan Expedition...	„			
212	Do.	„			
213	Do.	„			
214	Do.	„			
215	Do.	„			
216	Do.	„			
217	Do.	„			
218	Do.	„			
219	Do.	„			
220	Do.	„	Golden yellow, with darker tips. In two bottles. Collected by Dr. Anderson.		
221	Do.	„			

No.	Name.	Locality.	Date.
222	**Phyllorhina larvata,** *Horsfield*, ♀	Prome, Burmah	1868
223	,, ,, ,, ♀	,,	1868
224	,, ,, ,, ♀	,,	1868
225	,, ,, ,, ♀	,,	1868
226	,, ,, ,, ♀	,,	1868
227	,, ,, ,, ♀	,,	1868
228	,, ,, ,, ♀	,,	1868
229	,, ,, ,, ♂	,,	1868
230	,, ,, ,, ♂	,,	1868
231	,, ,, ,,	,,	1868
232	,, ,, ,,	,,	1868
233	,, ,, ,, ♂	Khasia Hills	1872
234	,, ,, ,, ♂	,,	1872
235	,, ,, ,, ♀ with fœtus	,,	1872
236	,, ,, ,, ♀	Sylhet	1872
237	,, ,, ,, ♀	Pegu	1872
238	,, ,, ,, ♀	,,	1872
239	,, ,, ,, ♀	,,	1872
240	,, ,, ,, ♂	,,	1872
241	,, ,, ,, ♂	,,	1872
241*a*	**P. galerita,** *Cantor*	Lingasugur, Deccan	1876
242	**P. speoris,** *Schreber*, ♀	South India	1842
243	,, ,, ♂	,,	1842
244	,, ,,	,,	1842
245	,, ,,	Ceylon	1852
246	,, ,,	,,	1852
247	,, ,,	,,	1852
248	,, ,,	,,	1852
249	,, ,,	Dehra Doon	1854
250	,, ,,	Dukhun	.....
251	,, ,, ♀ young	Ceylon	.....
252	,, ,, ♂	,,	.....
253	,, ,, ♀	,,	.....
254	,, ,, young	,,	.....
255	,, ,, ♀	,,	.....
256	,, ,, ♂	,,	.....
257	,, ,, ♂	Prome, Burmah	1868
258	,, ,, ♀	Chanda	1869
258*a*	**P. bicolor,** ♂	Lingasugur, Deccan	1876
258*b*	,, ♀	,,	1876
259	**P. fulva,** *Gray*	Pind Dádun Khan, Punjab Salt Range.	1853
260	,, ,, ♀	,,	1853
261	,, ,, ♂	,,	1853
262	,, ,, ♀	.....	.....
263	,, ,,	.....	.....
264	,, ,,	.....	.....
265	,, ,,	.....	.....
266	,, ,,	.....	.....
267	,, ,,	South India	.....
268	,, ,,	Chanda	1867
269	,, ,,	,,	1867
270	,, ,, ♂	Ponsee	1868

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
222	Yunan Expedition...	In spirit...			
223	Do.	,,			
224	Do.	,,			
225	Do.	,,			
226	Do.	,,			
227	Do.	,,			
228	Do.	,,			
229	Do.	,,			
230	Do.	,,			
231	Do.	Skeleton...	Perfect, prepared in 1872	...	68
232	Do.	Skull	Imperfect.		
233	Lieut. Bourne	In spirit...	Two bluish-black, paler at the base of the hairs: one adult male with large glandular eminences on face; fur dark golden brown (No. 233).		
234	Do.	,,			
235	Do.	,,			
236	E. B. Baker, Esq. ...	,,	Dark brown.		
237	W. Theobald, Esq...	,,	Bluish-black, paler at base of hairs.		
238	Do.	,,	Do. do.		
239	Do.	,,	Do. do.		
240	Do.	,,	Do. do.		
241	Do.	,,	Do. do.		
241*a*	G. E. Dobson, M.B.	,,	.....	...	69
242	Sir W. Elliot.....	,,	.....	78 A	67
243	Do.	,,	.....	78 B	
244	Do.	Dried skin	.....	78 C	
245	Dr. Kelaart	,,	.....	78 D	
246	Do.	,,	.....	78 E	
247	Do.	,,	.....	78 F	
248	Do.	,,	.....	78 G	
249	L. C. Stewart, Esq...	,,	.....	78 J	
250	.....	Skull	Skull of a specimen from the Dukhun ...	78 K	
251	E. L. Layard, Esq...	In spirit.			
252	Do.	,,			
253	Do.	,,			
254	Do.	,,			
255	Do.	,,			
256	Do.	,,			
257	Yunan Expedition ..	,,	Collected by Dr. Anderson.		
258	Museum Collector...	,,	.....	...	70
258*a*	G. E. Dobson, M.B.	,,			
258*b*	Do.	,,			
259	W. Theobald, Esq...	Dried skin	Blyth's type of *Hipposideros cineraceus* ...	79 A	71
260	Do.	In spirit...	.....	79 B	
261	Do.	,,	.....	79 B	
262	.....	,,	Small specimen with wings from side of tarsus, taken from an unlabelled bottle containing several species.	? 80 A	
263	.....	,,	.....	? 80 B	
264	.....	,,	.....		
265	.....	,,	.....		
266	.....	,,	.....		
267	Sir W. Elliot	Dried skin	In very bad condition.		
268	Museum Collector...	,,			
269	Do.	,,			
270	Yunan Expedition...	In spirit...	Collected by Dr. Anderson.		

No.	Name.	Locality.	Date.
271	**Phyllorhina fulva**, *Gray*, ♂	Ponsee	1868
272	,, ,, ,,	,,	1868
272*a*	,, ,, ,, ♂	Isagine, Upper Burma	1875
272*b*	,, ,, ,, ♂	(Cave No. 5.)	1875
272*c*	,, ,, ,, ♂	,,	1875
272*d*	,, ,, ,, ♂	,,	1875
272*e*	,, ,, ,, ♂	,,	1875
272*f*	,, ,, ,, ♂	(Cave No. 4.)	1875
272*g*	,, ,, ,, ♂	,,	1875
272*h*	,, ,, ,, ♀	,,	1875
272*i*	,, ,, ,, ♂	(Cave No. 8.)	1875
272*j*	,, ,, ,, ♂	,,	1875
272*k*	,, ,, ,, ♂	,,	1875
242*l*	,, ,, ,, ♂	,,	1875
272*m*	,, ,, ,, ♂	,,	1875
272*n*	,, ,, ,, ♂	,,	1875
272*o*	,, ,, ,, ♂	,,	1875
272*p*	,, ,, ,, ♂	,,	1875
272*q*	,, ,, ,, ♂	,,	1875
272*r*	,, ,, ,, ♂	,,	1875
272*s*	,, ,, ,, ♀	,,	1875
272*t*	,, ,, ,, ♀	,,	1875
273	,, ,, ,,	Agra	1869
274	,, ,, ,, ♀	Cherra Punji	1870
275	,, ,, ,, ♂	Sibsagar, Assam	1872
276	,, ,, ,, ♀	,,	1872
277	,, ,, ,, ♀	Sylhet	1872
278	,, ,, ,, ♀	Kachh	1872
279	,, ,, ,, ♂	,,	1872
280	,, ,, ,, ♂	,,	1872
281	,, ,, ,, ♂	Prome, Burmah	1872
282	,, ,, ,, ♂	,,	1872
283	,, ,, ,, ♀	,,	1872
284	,, ,, ,, ♀	,,	1872
285	,, ,, ,, ♀	,,	1872
286	,, ,, ,,	Nazeerah, Assam	1872
286*a*	,, ,, ,, ♂	Gauri Sagar Temple, Assam.	1875
286*b*	,, ,, ,, ♂	,,	
286*c*	,, ,, ,, ♀	,,	
286*d*	,, ,, ,, ♀	,,	
	P. amboinensis, *Peters*		
	P. coronata, *Peters*		
	P. dorise, *Peters*		
	P. obscura, *Peters*		
287	**P. diadema**, *Geoff.*, ♂	Ceylon	183
288	,, ,, ♀	,,	183
289	,, ,, ♀	,,	183
290	,, ,,	,,	
291	,, ,,	Moulmein	183
292	,, ,, ♀	Darjeeling	
293	,, ,,	Odeypore	187
294	,, ,,	,,	187
295	,, ,,	,,	187
296	,, ,, ♂	Pullandur, C. P.	187

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
271	Yunan Expedition..	In spirit...	Collected by Dr. Anderson; skull removed.	...	71
272	Do.	Skull	Taken from the preceding specimen.		
72*a*	Dr. J. Anderson ...	In spirit.			
72*b*	Do. ...	,,	Western-China Expedition. Five adult ♂ specimens; fur bright golden yellow throughout.		
72*c*	Do. ...	,,			
72*d*	Do. ...	,,			
72*e*	Do. ...	,,			
72*f*	Do. ...	,,			
72*g*	Do. ...	,,			
72*h*	Do. ...	,,			
72*i*	Do. ...	,,			
72*j*	Do. ...	,,			
72*k*	Do. ...	,,			
72*l*	Do. ...	,,	Adult specimens; fur white at the base, with dark brown extremities. (See remarks on this collection at p. 71.)		
72*m*	Do. ...	,,			
72*n*	Do. ...	,,			
72*o*	Do. ...	,,			
72*p*	Do. ...	,,			
72*q*	Do. ...	,,			
72*r*	Do. ...	,,			
72*s*	Do. ...	,,			
72*t*	Do. ...	,,			
73	Riddell Museum ...	Dried skin.			
74	Major H. H. Godwin-Austen.	In spirit.			
75	S. E. Peal, Esq.....	,,			
76	Do.	,,			
77	E. B. Baker, Esq. ...	,,			
78	Dr. Stoliczka	,,			
79	Do.	,,			
80	Do.	,,			
81	W. Theobald, Esq...	In spirit ...	White and black.		
82	Do.	,,	Do.		
83	Do.	,,	With fœtus *in utero*; fur bright golden yellow.		
84	Do.	,,			
85	Do.	,,			
86	J. M. Foster, Esq....	,,	Very dark-coloured specimen.		
	.....	...	.....	...	72
	.....	...	.....	...	72
	.....	...	.....	...	73
	.....	...	.....	...	73
	Dr. Kelaart	In spirit ...	*Hipposideros lankadiva*, Kelaart	75 A	64
	Do.	,,	Do. do.	75 B	
	Do.	Dried skin	In bad condition	75 C	
	Do.	Skeleton...	Imperfect	75 C	
	Major S. R. Tickell..	Dried skin	.....	76 A	
	Dr. Anderson	In spirit.			
	V. Ball, Esq.	Dried skin.			
	Do.	,,			
	Do.	,,			
	W. T. Blanford, Esq.	In spirit.			

No.	Name.	Locality.	Date
297	**Phyllorhina masoni,** var., *Dobson*, ♂	Moulmein	1872
298	**P. nicobarensis,** *Dobson*, ♂ (Subg. Asellia.)	Nicobars	1871
299	**P. tricuspidata,** *Temm.*	Batchian Island	1872
300	**P. stoliczkana,** *Dobson*, ♂	Penang	1871
301	**Trisenops persicus,** *Dobson*, ♀	Shiraz, Persia	1870
302	,, ,, ,, ♀	,,	1870
303	,, ,, ,, ♀	,,	1870
304	,, ,, ,, ♂	,,	1870
305	**Coelops frithii,** *Blyth*	Sunderbuns, Bengal	1846
			Family
306	**Rhinopoma hardwickii,** *Gray*, ♂	Agra	1844
307	,, ,, ,, ♂	,,	1844
308	,, ,, ,,	,,	1844
309	,, ,, ,,	,,	1844
310	,, ,, ,,	,,	1844
311	,, ,, ,,	,,	1844
312	,, ,, ,,		
313	,, ,, ,,		
314	,, ,, ,,	Agra	1869
315	,, ,, ,,	,,	1869
316	,, ,, ,, ♂	Kachh	1872
317	,, ,, ,, ♂	,,	1872
318	**Nyctinomus plicatus,** *Buch. Ham.*, ♂	Calcutta	
319	,, ,, ,,	,,	
320	,, ,, ,,	,,	
321	,, ,, ,,	,,	
322	,, ,, ,,	Ludiana	1845
323	,, ,, ,,	,,	1845
324	,, ,, ,,	Agra	1869
325	,, ,, ,,	,,	1869
326	,, ,, ,,	,,	1869
327	**N. tragatus,** *Dobson*, ♂	Calcutta	
328	,, ,, ♂	Jashpur, west of Chutia Nagpur.	1871
329	,, ,, ♀	Rajanpur, Punjab frontier.	1872
330	**N. cestonii,** *Savi*, ♂	Amoy, China	1860
331	**N. johorensis,** *Dobson*, ♂	Johore, Malay peninsula.	1872
332	**Cheiromeles torquatus,** *Horsf.*	Java	1845
332*a*	**Rhynchonycteris naso,** *Wied*, ♂	Demerara, S. America	1874
333	**Taphozous saccolaimus,** *Temm.*	Southern India	1843
334	,, ,, ,,	Java	1845
335	,, ,, ,, ♀	Sylhet	1872
336	**T. longimanus,** *Hardw.*	Calcutta	
337	,, ,,	,,	
338	,, ,,	,,	
339	,, ,,	,,	
340	,, ,,	,,	
341	,, ,,	,,	
342	,, ,,	,,	

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
297	Captain Hood	In spirit ...	(Type.)	...	62
298	Dr. Stoliczka	,,	(Type.)	...	63
299	Exchange, Berl. Mus.	,,	.....	...	59
300	Dr. Stoliczka	,,	(Type.)	...	61
301	Museum Collector...	,,	(Type.)	...	56
302	Do.	,,			
303	Do.	,,			
304	Do.	Skeleton ...	Perfect skeleton, prepared in 1872.		
305	W. G. Frith, Esq....	Dried skin	In very dilapidated condition. (Type.)...	81 A	74
EMBALLONURIDÆ.					
306	Major Wroughton ..	In spirit ...	.....	83 A	176
307	Do.	,,	.....	83 B	
308	Do.	Dried skin	.....	83 C	
309	Do.	,,	.....	83 D	
310	Do.	,,			
311	Do.	Skeleton...	Imperfect	83 F	
312	.....	Skull	Locality and donor unknown.		
313	.....	,,	Do. do.		
314	Riddell Museum ...	Dried skin.			
315	Do.	,,			
316	Dr. Stoliczka	In spirit ...	Male with large deposit of fat at the root of the tail.		
317	Do.	,,	Do. do.		
318	.....	,,	.....	88 E	182
319	.....	Dried skin	.....	88 C	
320	.....	,,	.....	88 D	
321	.....	Skeleton ...	Imperfect	88 G	
322	Captain Boys.....	Dried skin	.....	88 A	
323	Do.	,,	.....	88 B	
324	Riddell Museum ...	,,			
325	Do.	,,			
326	Do.	,,			
327	.....	In spirit ...	Taken from bottle 88. (Type.)	88 F	181
328	W. T. Blanford, Esq.	,,			
329	W. F. Murray, M.B.	,,			
330	R. Swinhoe, Esq. ...	,,	Type of *N. insignis*, Blyth	87 A	180
	James Wood-Mason, Esq.	,,	(Type.)	...	183
	Batavian Society ...	Dried skin	.....	86 A	177
334	G. E. Dobson, M.B.	In spirit.			
	Sir W. Elliot.....	Dried skin	.....	84 A	172
	Batavian Society ...	,,	.....	84 B	
	E. B. Baker, Esq.	In spirit.			
	.....	Dried skin	.....	85 A	170
	.....	,,	.....	85 B	
	.....	,,	.....	85 C	
	.....	,,	.....	85 D	
	.....	,,	.....	85 E	
	.....	,,	.....	85 F	
	.....	Skeleton ...	Imperfect	85 M	

No.	Name.	Locality.	Date.
343	**Taphozous longimanus**, *Hardw.*	Travancore	1841
344	,, ,, ,,	.....	.....
345	,, ,, ,,	.....	.....
346	,, ,, ,, ♂	Rangoon	1852
347	,, ,, ,, ♀	,,	1852
348	,, ,, ,, ♂	,,	1852
349	,, ,, ,, ♀ very young	,,	1852
350	,, ,, ,, ♀	,,	1852
351	,, ,, ,,	Ceylon	.....
352	,, ,, ,,	,,	.....
353	,, ,, ,,	Chanda	1867
354	,, ,, ,, ♂	Calcutta	1870
355	,, ,, ,, ♀	,,	1870
356	,, ,, ,, ♂	Singhboom	1870
357	,, ,, ,, ♂	Bilaspur, C. P.	1871
358	,, ,, ,, ♂	Pegu	1872
359	,, ,, ,, ♀	,,	1872
360	,, ,, ,, ♂	,,	1872
361	**T. theobaldi**, *Dobson*, ♀	Tenasserim	1855
362	,, ,, ♂	,,	1855
363	**T. nudiventris**, *Rüpp.*, ♂	Kachh	1872
364	**T. melanopogon**, *Temm.*, ♂	.....	1872
365	,, ,, ♂	.....	1872
366	,, ,, ♂	.....	1872
367	,, ,, ♀	Jashpur, Chota Nagpur	1871
368	,, ,, ♀	,,	1871
369	,, ,, ♀	,,	1871
370	,, ,, ♀	,,	1871
371	,, ,, ♂	Amherst, Lower Burmah	1872
372	,, ,, ♂	Unknown	.....
372*a*	,, ,, ♂	Isagine, Upper Burmah (Cave No. 5).	1875
372*b*	,, ,, ♀	,,	1875
372*c*	,, ,, ♀	,,	1875
372*d*	,, ,, ♀	,,	1875
372*e*	,, ,, ♀	,,	1875
372*f*	,, ,, ♀	,,	1875
			Fam
373	**Chalinolobus gouldii**, *Gray*	Australia	1846
374	**Scotophilus temminckii**, *Horsf.*	Calcutta	.....
375	,, ,, ,,	,,	.....
376	,, ,, ,,	,,	.....
377	,, ,, ,,	,,	.....
378	,, ,, ,,	,,	.....
379	,, ,, ,,	,,	.....
380	,, ,, ,,	,,	.....
381	,, ,, ,,	,,	.....
382	,, ,, ,,	,,	.....
383	,, ,, ,,	,,	.....
384	,, ,, ,,	,,	.....
385	,, ,, ,,	,,	.....
386	,, ,, ,, ♀	,,	.....
387	,, ,, ,, ♂	,,	.....

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
343	Dr. Coles	Dried skin	Labelled *Taphozous brevicaudus*	85 J	170
344	.....	Skull	Do. *Taphozous cantori*, Blyth.		
345	.....	,,	Imperfect, labelled *T. brevicaudus*.		
346	Dr. Fayrer.....	In spirit...			
347	Do.	,,			
348	Do.	,,	.....	85 G	
349	Do.	,,			
350	Do.	,,			
351	Dr. Kelaart	Dried skin	In bad condition	85 H	
352	Do.	,,	Do.	85 L	
353	Museum Collector...	,,			
354	Dr. Anderson.....	In spirit.			
355	Do.	,,			
356	V. Ball, Esq.	,,			
357	W. T. Blanford.....	,,			
358	W. Theobald, Esq...	,,			
359	Do.	,,			
360	Do.	,,			
361	Do.	,,	Bottle 84 D, E, old collection. (Type.)...	84 D	168
362	Do.	,,	Do. do.	84 E	
363	Dr. Stoliczka	,,	Subsp. *T. kachhensis*, Dobson. (Type.).	...	171
364	.....	,,	.....	...	167
365	.....	,,			
366	.....	,,			
367	W. T. Blanford, Esq.	,,			
368	Do.	,,			
369	Do.	,,			
370	Do.	,,			
371	Dr. Anderson.....	,,			
372	Unknown	Skeleton...	Perfect skeleton, prepared in 1872.		
72*a*	Dr. J. Anderson ...	In spirit...			
72*b*	Do.	,,			
72*c*	Do.	,,	Western-China Expedition.		
72*d*	Do.	,,			
72*e*	Do.	,,			
72*f*	Do.	,,			
ESPERTILIONIDÆ.					
373	Sydney Institution...	Dried skin			
374	.....	,,			
375	.....	,,			
376	.....	,,			
377	.....	,,			
378	.....	,,			
379	.....	,,	Specimens of large size, labelled *Nycticejus luteus*, Blyth, 92 A.	92 A	
380	.....	,,		93 A	
381	.....	,,			
382	.....	,,			
383	.....	,,			
384	.....	,,			
385	.....	,,			
386	.....	In spirit...	.....	93 B	
387	.....	,,	.....	93 B	

No.	Name.	Locality.	Date.
388	**Scotophilus temminckii**, *Horsf.*, ♀	Calcutta	.....
389	,, ,, ,, ♂♂♀	,, ...	.....
390	,, ,, ,, ♂♀♀	,, ...	.....
391	,, ,, ,, ♂	,, ...	.....
392	,, ,, ,, ...	,, ...	.....
393	,, ,, ,, ...	,, ...	.....
394	,, ,, ,, ...	,, ...	.....
395	,, ,, ,, ...	.....	.....
396	,, ,, ,, ...	.....	.....
397	,, ,, ,, ...	Java	1845
398	,, ,, ,, ...	Dacca	1860
399	,, ,, ,, ♂	Kyndoolip, Burmah	1868
400	,, ,, ,, ♂♂	,, ...	1868
401	,, ,, ,, ♂♂♂	,, ...	1868
402	,, ,, ,, ♂♂♂♂	Calcutta	.....
403	,, ,, ,, ♀♀♀	,, ...	.....
404	,, ,, ,, ♀	,, ...	.....
405	,, ,, ,, ...	,, ...	.....
406	,, ,, ,, ...	,, ...	.....
407	,, ,, ,, ♂	Raneegunge	1869
408	,, ,, ,, ♂♂♂	.....	.....
409	,, ,, ,, ♂♂♂	.....	.....
410	,, ,, ,, ♂♂♂	.....	.....
411	,, ,, ,, ♂♂♂	.....	.....
412	,, ,, ,, ♂♂♂♂	Calcutta	1870
413	,, ,, ,, ♂♂♂♂	,, ...	1870
414	,, ,, ,, ♂♂♂♂	,, ...	1870
415	,, ,, ,, ♂♂♂♂	,, ...	1870
416	,, ,, ,, ♂♂♂♂	Rajmahal	.....
417	,, ,, ,, ♂♂♂♂	Calcutta	.....
418	,, ,, ,, ♂♂♂♂	,, ...	.....
419	,, ,, ,, ♂♂♂♂	,, ...	.....
420	,, ,, ,, ♂♂♂♂♀♀♀	,, ...	.....
421	,, ,, ,, ♂♂♂♂♀♀♀	,, ...	.....
422	,, ,, ,, ♂♂♂♂♀♀♀	,, ...	.....
423	,, ,, ,, ♂♂♂♂♀♀♀	,, ...	.....
424	,, ,, ,, ♂♂♂♂♂	,, ...	.....
425	,, ,, ,, ♂♂♂♂♂	,, ...	.....
426	,, ,, ,, ♂♂♂♂♂	,, ...	.....
427	,, ,, ,, ♂♂♂♂♂	Bilaspur	1870
428	,, ,, ,, ♂♂♂♂♂	Allahabad	.....
429	,, ,, ,, ♂♂♂♂♂♀	Bengal	.....
430	,, ,, ,, ♂♂♂♂♂♀	,, ...	.....
431	,, ,, ,, ♂♂♂♂♂♀♀	,, ...	.....
432	,, ,, ,, ♂♂♂♂♂♀♀♀	,, ...	.....
433	,, ,, ,, ♂♂♂♂♂♀♀♀	,, ...	.....
434	,, ,, ,, ♂♂♂♂♂♀♀♀	Burmah	1872
435	,, ,, ,, ...	Calcutta	.....
436	,, ,, ,, ♂	Gowhatty	.....
437	,, ,, ,, ♂♂♂	,, ...	.....
438	,, ,, ,, ♂♂♂	Dhappa	.....
439	,, ,, ,, ♂♂♂	,, ...	.....
440	,, ,, ,, ♀	Allahabad	.....

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
388	.....	In spirit...	.....	93 B	120
389	.....	,,	Specimens of individuals apparently fully grown (*N. luteus*, Blyth)		
390	.....	,,			
391	.....	,,		92 B	
392	.....	Skull	In bad condition; labelled *N. belangeri*...	93 C	
393	.....	,, ...	Do. do. ...	93 C	
394	.....	Skeleton...	Labelled *N. flavescens*, Blyth	92	
395	.....	Skull	In bad condition; labelled *N. luteus*	92 C	
396	.....	Skeleton...	Imperfect	92 D	
397	Batavian Society ...	Dried skin	Corresponds in Blyth's catalogue to *N. castaneus*, Gray.....	94 A	
398	Major R. C. Tytler..	Dried skin	Do. do.	94 B	
399	Yunan Expedition..	In spirit...	Collected by Dr. Anderson.		
400	Do. ..	,,	Do. do.		
401	Do. ..	,,	Do. do.		
402	.....	,,			
403	.....	,,			
404	.....	,,			
405	V. Ball, Esq.	Dried skin	Mounted on a board; labelled *N. luteus*.		
406	Do.	,,	Do. do.		
407	Purchased	In spirit.			
408	.....	,,	Locality and donor unknown.		
409	.....	,,			
410	.....	,,			
411	.....	,,			
412	Purchased	,,			
413	Do.	,,			
414	Do.	,,			
415	Do.	,,			
416	V. Ball, Esq.	,,			
417	Do.	,,			
418	Do.	,,			
419	Dr. Anderson	,,			
420	Do.	,,			
421	Do.	,,			
422	Do.	,,			
423	Do.	,,			
424	Do.	,,			
425	Do.	,,			
426	Do.	,,			
427	W. T. Blanford, Esq.	,,	Fully grown individual.		
428	Dr. Whitwell.....	,,			
429	Museum Collector...	,,			
430	Do. ...	,,			
431	Do. ...	,,			
432	Do. ...	,,			
433	Do. ...	,,			
434	W. Theobald, Esq...	,,			
435	Dr. King	,,			
436	G. E. Dobson, M.B..	,,			
437	Do.	,,			
438	Mr. O. L. Fraser ...	,,			
439	Do. ...	,,			
440	Mr. Cookburn	,,			

No.	Name.	Locality.	Date.
441	**Scotophilus temminckii**, *Horsf.*, ♀	Allahabad	.....
442	" " " ♂	"	.....
443	" " "	Nilgiris	.....
444	" " "	Chanda	1867
445	" " "	"	1861
446	" " "	Cachar	1867
447	" " "	Calcutta	.....
448	" " " ♂	"	1872
449	" " " ♂	"	1872
450	" " "	? "	.....
451	" " "	? "	.....
452	" " "	? "	.....
453	" " "	? "	.....
454	" " "	? "	.....
455	" " "	Chanda	.....
455*a*	" " " ♀	Marampur, Assam	1875
455*b*	" " " ♀	"	1875
455*c*	" " " ♀	"	1875
455*d*	" " " ♀	"	1875
455*e*	" " " ♀	"	1875
456	**S. heathii**, *Horsfield*, ♂	Coromandel	1843
457	" "	"	1843
458	" " ♂	Ceylon	1850
459	" " ♀	"	1850
460	" "	"	1850
461	" "	"	1850
462	" "	Madras	.....
463	" " ♀	Rajanpur, Punjab frontier.	1872
464	**S. ornatus**, *Blyth*	Darjeeling	1858
465	" " ♀	Ponsee, Kakyen Hills	1868
466	" " ♂	Nantin and Sanda valley, Yunan.	1868
467	" " ♀	"	1868
468	" "	Nantin, Yunan	1868
469	" "	Darjeeling	1870
470	" "	"	1872
471	" "	"	1872
472	" "	"	1872
473	**S. emarginatus**, *Dobson*	Unknown	.....
473*a*	**S. pallidus**, *Dobson*, ♀	Mian Mur, Lahore	1875
474	**Vesperus tickelli**, *Blyth*	Chaibassa	1842
475	" " "	"	1842
476	" " "	"	1842
477	" " "	"	1842
478	" " " ♂	Andaman Islands	.....
479	" " " ♀	"	.....
480	" " " ♀	"	.....
481	" " "	Singhboom	1869
482	" " " ♂	Sirguja	1871
483	" " "	Jashpur	1871

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
441	Mr. Cockburn	Dried skin	.....	...	120
442	Do.	„			
443	W. Theobald, Esq....	„			
444	Museum Collector...	„			
445	Do.	„			
446	Do.	„			
447	A. C. Carlyle, Esq....	„			
448	Dr. Anderson	Skeleton...	Two perfect skeletons, one of a perfectly adult individual (*N. luteus*, Blyth), the other of a smaller specimen.		
449	Do.	„			
450	.....	In spirit...	In an unlabelled bottle.		
451	.....	„			
452	.....	„			
453	.....	„			
454	.....	„			
455	W. T. Blanford, Esq.	„			
455*a*	Maj. H. H. Godwin-Austen.	„	Reddish yellow.		
455*b*	Do.	„	Do.		
455*c*	Do.	„	Brown.		
455*d*	Do.	„	Do.		
455*e*	Do.	„	Do.		
456	Sir W. Elliot.....	„	.....	91 A	122
457	Do.	Dried skin	.....	91 B	
458	E. L. Layard, Esq...	In spirit...	.....	91 C	
459	Do.	Skeleton...	Perfect skeleton, prepared in 1873.....	91 C	
460	Do.	Dried skin	.....	91 D	
461	Do.	„	.....	91 D	
462	.....	Skull	In bad condition	91 E	
463	W. F. Murray, M.B.	In spirit.			
464	Purchased	Dried skin	.....	90 B	124
465	Yunan Expedition...	In spirit...	Collected by Dr. Anderson.		
466	Do.	„	Male, with skull removed, from Nantin.		
467	Do.	Skeleton...	467 perfect skeleton, prepared in 1873.		
468	Do.	Skull	Skull of preceding, lower jaw wanting.		
469	Captain Elwes	Dried skin			
470	Dr. Stoliczka	„			
471	Do.	„	Immature specimen.		
472	W. S. Atkinson, Esq.	„			
473	Unknown	In spirit...	Taken from bottle 93 B (*vide* Nos. 386–8).	...	123
473*a*	Dr. J. S. Gunn	„	(Type.)	...	186
474	Major Tickell	Dried skin	.....	95 A	113
475	Do.	„	.....	95 B	
476	Do.	„	.....	95 C	
477	Do.	Skull	.....	95 D	
478	Lieut.-Col. Tytler....	In spirit.			
479	Do.	„			
480	Do.	„			
[illegible]	Museum Collector...	Dried skin.			
[illegible]	W. T. Blanford, Esq.	In spirit.			
[illegible]	Do.	Dried skin.			

No.	Name.	Locality.	Date.
484	**Vesperus atratus,** *Blyth*, ♀	Darjeeling	1853
485	" " ♀	"	1853
486	**V. pachyotis,** *Dobson*, ♂	Khasia Hills	1872
487	" " ♀	"	1872
488	**V. serotinus,** *Schr.*	Shiraz, Persia	1871
489	" "	"	1871
490	**V. andersoni,** *Dobson*	Momein, Yunan	1868
491	" "	"	1868
492	**Vesperugo serotinus,** *Schr.*	France	1852
493	" " " ♀	Galicia	1872
493*a*	" " " ♀	Kashmir	1875
493*b*	" " " juv. ♀	"	1875
493*c*	" " " ♂	"	1875
493*d*	" " " ♂	"	1875
493*e*	" " " ♂	"	1875
494	**V. discolor,** *Natt.*, ♂	Berlin	1872
494*a*	" " ♀	Kizil	1875
494*b*	**V. borealis,** *Nilsson*, ♀	Yangihissar	1875
494*c*	" " ♂	"	1875
494*d*	" " ♂	Kizil	1875
495	**V. pachypus,** *Temm.*, ♂	Tenasserim	1858
496	" " ♀	"	1858
497	" " ♀	"	1858
498	" " ♀	"	1858
499	" " ♀	"	1858
500	" "	Darjeeling	1871
501	" "	"	1871
502	" "	"	1871
503	" "	Andamans	1871
504	" "	"	1871
505	" "	"	1871
506	" "	"	1871
507	" "	"	1871
508	" "	"	1871
509	" "	"	1871
510	" "	"	1871
511	" "	"	1871
512	" "	"	1871
513	" "	"	1871
514	" "	"	1871
515	" "	"	1872
516	" "	"	1871
517	" "	"	1871
518	" "	"	...
519	**V. abramus,** *Temm.*	Calcutta	...
520	" "	"	...
521	" "	"	...
522	" " ♂	"	...
523	" " ♀	"	...
524	" "	"	...
525	" "	"	...
526	" "	"	...

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
484	Maj. W. S. Sherwill	In spirit...	One specimen much dilapidated	96 A	107
485	Do.	,,		96 B	
486	Lieut. Bourne	,,	.....	...	104
487	Do.	,,			
488	Museum Collector...	Dried skin	Type of *V. shiraziensis*, Dobson	...	108
489	Do.	,,			
490	Yunan Expedition...	In spirit...	Collected by Dr. Anderson	...	110
491	Do.	Skeleton ...	Perfect skeleton, prepared in 1873.		
492	M. Malherbe	Dried skin	.....	100 A	
493	Exchange, Berlin Museum.	In spirit.			
93a	Yarkund Expedition, 1874. Collected by Dr. F. Stoliczka.	,,			
93b		,,			
93c		,,			
93d		,,			
93e		,,			
94	Exchange, Berlin Museum.	,,	.....	...	106
94a	Yarkund Expedition, 1874. Collected by Dr. F. Stoliczka.	,,	Extremities of the hairs pale yellow or white.		
94b		,,	.....	...	105
94c		,,			
94d		,,			
95	Major Berdmore ...	,,			
96	Do.	,,			
97	Do.	,,	*Scotophilus fulvidus*, Blyth	103 A	115
98	Do.	,,			
99	Do.	,,			
00	Dr. Stoliczka	,,			
01	Do.	,,			
02	Do.	Dried skin.			
03	J. Homfray, Esq. ...	In spirit...			
04	Do.	,,			
05	Do.	,,			
06	Do.	,,			
07	Do.	,,			
08	Do.	,,	Several male and female specimens.		
09	Do.	,,			
10	Do.	,,			
11	Do.	,,			
12	Do.	,,			
13	Do.	,,			
14	Do.	,,			
	James Wood-Mason, Esq.	,,			
	Do.	,,	Several male and female specimens.		
	Do.	,,			
	Do.	,,			
	Do.	Skeleton ...	Perfect skeleton.		
	.....	Dried skin	A series of stuffed skins in very bad condition. *Scotophilus coromandelianus*, F. Cuvier, according to Blyth.	105 A	97
	.....	,,			
	.....	,,			
	.....	In spirit...	.....	105 B	
	.....	,,			
	.....	Skull	In bad condition	105 C	
	.....	,,			
	.....	,,			

No.	Name.	Locality.	Date.
527	**Vesperugo abramus**, *Temm.*	Unknown	.....
528	,, ,, ,, ...	,, ...	.....
529	,, ,, ,, ...	,, ...	.....
530	,, ,, ,, ...	,, ...	.....
531	,, ,, ,, ...	Nicobars	.....
532	,, ,, ,, ...	Pegu	.....
533	,, ,, ,, ♂	Chanda	1867
534	,, ,, ,, ♂♂	Cachar	1867
535	,, ,, ,, ♂♂♀	,, ...	1867
536	,, ,, ,, ♂	Shiraz, Persia	1871
537	,, ,, ,, ♂	,, ...	1871
538	,, ,, ,, ♂	,, ...	1871
539	,, ,, ,, ♂	,, ...	1871
540	,, ,, ,, ♂♂	,, ...	1871
541	,, ,, ,, ♂♀	,, ...	1871
542	,, ,, ,, ♀	,, ...	1871
543	,, ,, ,, ...	Darjeeling	1871
544	,, ,, ,, ...	Hazareebaugh	1872
545	,, ,, ,, ...	Darjeeling	1872
546	,, ,, ,, ...	Khasia Hills	1872
547	,, ,, ,, ...	,, ...	1872
548	,, ,, ,, ...	,, ...	1872
549	,, ,, ,, ...	,, ...	1872
550	,, ,, ,, ...	,, ...	1872
551	,, ,, ,, ...	,, ...	1872
552	,, ,, ,, ...	,, ...	1872
553	,, ,, ,, ...	,, ...	1872
554	,, ,, ,, ...	,, ...	1872
555	,, ,, ,, ...	,, ...	1872
556	,, ,, ,, ...	,, ...	1872
557	,, ,, ,, ...	,, ...	1872
558	,, ,, ,, ...	,, ...	1872
559	,, ,, ,, ...	,, ...	1872
560	,, ,, ,, ...	Sibsaugor, Assam	1872
561	,, ,, ,, ...	,, ...	1872
562	,, ,, ,, ...	,, ...	1872
563	,, ,, ,, ...	,, ...	1872
564	,, ,, ,, ...	,, ...	1872
565	,, ,, ,, ...	Pachmari	1872
566	,, ,, ,, ...	,, ...	1872
567	,, ,, ,, ...	,, ...	1872
568	,, ,, ,, ...	,, ...	1872
569	,, ,, ,, ♀	Hazareebaugh	1872
570	,, ,, ,, ♀♀	Sirguja	1872
571	,, ,, ,, ...	Goalparah, Assam	1872
572	,, ,, ,, ...	,, ...	1872
573	,, ,, ,, ...	,, ...	1872
574	,, ,, ,, ...	,, ...	1872
575	,, ,, ,, ♀	Garo Hills	1872
576	,, ,, ,, ♀	,, ...	1872
577	,, ,, ,, ♂♂	Nazeerah, Assam	1872
578	,, ,, ,, ♂♀♀	,, ...	1872
578*a*	,, ,, ,, ♂♀	Munipur Hills	1872
579	,, ,, ,, ♂	Sibsaugor, Assam	1872

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
527	Unknown	In spirit...	Taken from an unlabelled bottle containing several species.	...	97
528	Do.	„			
529	Do.	„			
530	Do.	„			
531	Captain Homfray ...	„			
532	Dr. Stoliczka	„			
533	Museum Collector...	„			
534	Do.	„			
535	Do.	„			
536	Do.	„	Immature specimens.		
537	Do.	„			
538	Do.	„			
539	Do.	„			
540	Do.	„			
541	Do.	„			
542	Do.	„			
543	Captain Elwes	Dried skin.			
544	W. T. Blanford, Esq.	„			
545	L. Mandelli, Esq. ...	„			
546	Lieut. Bourne	In spirit.			
547	Do.	„	A large number of individuals of both sexes.		
548	Do.	„			
549	Do.	„			
550	Do.	„			
551	Do.	„			
552	Do.	„			
553	Do.	„			
554	Do.	„			
555	Do.	„			
556	Do.	„			
557	Do.	„			
558	Do	„			
559	Do.	„			
560	S. E. Peal, Esq.....	Dried skin	Immature specimens.		
561	Do.	„			
562	Do.	„			
563	Do.	„			
564	Do.	„			
565	Dr. Whitwell.....	In spirit.			
566	Do.	„			
567	Do.	„			
568	Do.	„			
569	W. T. Blanford, Esq.	„			
570	Do.	„			
571	H. L. Houghton, Esq.	„			
572	Do.	„			
573	Do.	„			
574	Do.	„			
575	Major H. H. Godwin-Austen.	„	All in one bottle.		
576	Do.	„			
577	J. M. Foster, Esq...	„			
578	Do.	„			
579	Maj. Godwin-Austen.	„			
580	S. E. Peal, Esq.....	„			

No.	Name.	Locality.	Date.
580	**Vesperugo abramus,** *Temm.*, ♀	Sibsaugor, Assam	1872
581	„ „ „ ♀	„	1872
582	„ „ „ ♀	„	1872
583	„ „ „ ♂	Sylhet	1872
584	„ „ „ ♂	Ranchi, Chota Nagpur	1872
585	„ „ „ ♀	„	1872
586	„ „ „ ♂	Chota Nagpur	1872
587	„ „ „ ♂	„	1872
588	„ „ „ ♀	„	1872
589	„ „ „ ♀	„	1872
590	„ „ „	Purneah	1872
591	„ „ „	„	1872
592	„ „ „ ♂	Java	1872
593	„ „ „ ♂	Darjeeling	1872
594	„ „ „ ♂	„	1872
595	„ „ „ ♂	„	1872
596	„ „ „ ♂	„	1872
597	„ „ „ ♂	„	1872
598	„ „ „ ♂	„	1872
599	„ „ „	India	.....
600	„ „ „	„	.....
601	„ „ „	„	.....
602	„ „ „	„	1872
603	„ „ „	„	1872
604	„ „ „	„	.....
605	„ „ „	„	.....
606	„ „ „	„	.....
607	„ „ „	„	.....
608	„ „ „	„	.....
609	„ „ „	„	.....
610	„ „ „	Rajanpur, P. Frontier	.....
611	„ „ „	„	.....
612	„ „ „	„	.....
613	„ „ „	„	.....
614	„ „ „	„	.....
615	**V. kuhlii,** *Natt.*	Calcutta	.....
616	„ „	„	.....
617	„ „	Cachar	1867
618	„ „	„	1867
619	„ „ ♀	Calcutta	.....
620	„ „ young	„	.....
621	„ „ ♂	„	.....
622	„ „ ♂	„	1870
623	„ „	„	1870
624	„ „	Purneah	.....
625	„ „	Dhappa, Calcutta	1872
625*a*	„ „ ♂	Lingasugur, Deccan	1876
625*b*	„ „ ♀	„	1876
626	„ „ ♂	North Italy	1872
627	„ „ ♀	„	1872
628	„ „	Shiraz, Persia	1871
629	„ „ var. **affinis,** *Dobson*, ♀	Bhamo, Yunan	1868
630	„ „ var. **leucotis,** *Dobson*, ♂	Rajanpur, Punjab Frontier.	1871

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
580	S. E. Peal, Esq.....	In spirit ...	.....	...	97
581	Do.	,,			
582	Do.	,,			
583	E. B. Baker, Esq....	,,			
584	W. T. Blanford, Esq.	,,			
585	Do.	,,			
586	Do.	,,			
587	Do.	,,			
588	Do.	,,			
589	Do.	,,			
590	Dr. Anderson.....	,,			
591	Do.	,,			
592	Exchange, Berlin Museum.	,,			
593	W. S. Atkinson, Esq.	,,			
594	Do.	,,			
595	Do.	,,			
596	Do.	,,			
597	Do.	,,			
598	Do.	,,			
599	Unknown	...			
600	Do.	...			
601	Do.	...			
602	Do.	...			
603	Do.	...			
604	Do.	...	From mixed collection.		
605	Do.	...			
606	Do.	...			
607	Do.	...			
608	Do.	...			
609	Do.	...			
0	G. E. Dobson, M.B.	In spirit...			
1	Do.	,,			
2	Do.	,,			
3	Do.	,,			
4	Do.	,,			
5	.....	Dried skin	In very bad condition	99 A	94
6	.....	,,	Do.	99 A	
	Museum Collector...	,,			
	Do.	,,			
	Mrs. Dillon	In spirit.			
	Do.	,,			
	Do.	,,			
	Dr. Anderson	,,			
	Do.	,,			
	Do.	,,			
	Mr. O. L. Fraser ...	,,			
	G. E. Dobson, M.B.	,,			
	Do.	,,			
	Exchange, Berlin Museum.	,,			
	Do.	,,			
	Museum Collector...	Dried skin.			
	Yunan Expedition...	In spirit.			
	W. F. Murray, Esq., M.B.	,,			

No.	Name.	Locality.	Date.
631	**Vesperugo kuhlii,** ♂	Cherra Punji	1871
632	**V. akokumuli,** *Temm.*, ♀	Japan	1872
633	**V. imbricatus,** *Horsf.*, ♂	Java	1872
634	**V. maurus,** *Blas.*, ♂	Geneva	1872
635	**V. pipistrellus,** *Schr.*, ♂	Berlin, Prussia	1872
635*a*	„ „ ♂	England	1876
635*b*	„ „ ♂	Yangihissar	1875
635*c*	„ „ ♂	„	1875
635*d*	„ „ ♂	„	1875
635*e*	„ „ ♂	„	1875
635*f*	„ „ ♀	„	1876
635*g*	„ „ ♀	„	1875
635*h*	„ „ ♀	„	1875
635*i*	„ „ ♀	„	1875
635*j*	„ „ ♀	„	1875
635*k*	„ „ ♀	„	1875
636	„ „	Amoy, China	1859
637	**V. annectens,** *Dobson*, ♀	Naga Hills, Assam	1871
638	**V. pipistrellus,** *Keys. & Blas.*, ♀	Berlin, Prussia	1872
639	**V. leisleri,** *Kuhl*	England	1846
640	„ „ ♀	Brandenbourg	1872
641	**V. noctula,** *Schreber*	England	1845
642	„ „		1844
643	„ „		1844
644	„ „ ♂	Darjeeling	1871
645	„ „ ♀	Galicia	1872
646	**Vespertilio muricola,** *Hodgs.*	Calcutta	1844
647	„ „ „	„	1844
648	„ „ „	Ceylon	1850
649	**V. murinus,** *L.*	Masuri	1852
650	„ „ ♂	Hungary	1864
651	„ „ ♀	„	1864
652	„ „ ♀	„	1864
653	„ „	Shiraz, Persia	1871
654	**V. formosus,** *Hodgs.*	Darjeeling	1870
655	„ „ ♀	Cherra Punji	1871
656	„ „ ♀	Goalparah, Assam	1870
657	„ „	Darjeeling	1871
658	**V. montivagus,** *Dobson*, ♂	Hotha, Yunan	1868
659	„ „ ♀	„	1868
660	„ „ ♀	„	1868
661	„ „ ♀	„	1868
662	„ „ ♀	„	1868
663	„ „ ♀	„	1868
664	**V. muricola,** *Hodgs.*, ♀	Borneo	1870
665	**V. nattereri,** *Kuhl*, ♂	Mulhouse	1872
666	**V. mystacinus,** *Leisl.*, ♀	Galicia	1872

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
631	Major H. H. Godwin-Austen.	In spirit ...	.....	...	94
632	Exchange, Berlin Museum.	"			
633	Do.	"	....	...	93
634	Do.	"	....	...	99
635	Do.	"	.....	...	95
635*a*	G. E. Dobson, M.B.	"			
635*b*	Collected by the late Dr. F. Stoliczka during the second Yarkand Expedition in 1874.	"	*Fur* pale straw-colour above, white beneath; the basal half of the hairs black or dark brown.		
635*c*		"			
635*d*		"			
635*e*		"			
635*f*		"			
635*g*		"			
635*h*		"			
635*i*		"			
635*j*		"			
635*k*		"			
636	R. Swinhoe, Esq. ...	Dried skin.			
637	Captain J. Butler...	In spirit ...	.....	...	116
638	Exchange, Berlin Museum.	"	Labelled *V. natkusii*, Keys. & Blas.		
639	H. E. Strickland, Esq.	Dried skin	.....	102 A	91
640	Exchange, Berlin Museum.	In spirit.			
641	H. E. Strickland, Esq.	Dried skin	.....	89 A	88
642	Mr. Bartlett	"	.....	89 B	
643	Do.	"	.....	89 C	
	Dr. F. Stoliczka.....	In spirit.			
	Exchange, Berlin Museum.	"			
	.....	Dried skin	.....	110 A	134
	.....	Skull	Skull of preceding	110 B	
	Dr. Kelaart	"	.....	110 C	
	Captain F. Hutton..	Dried skin	.....	111 A	137
	Hungarian Museum.	In spirit.			
	Do.	...			
	Do.	...			
	Museum Collector...	Dried skin.			
	Captain Elwes	"	.....	...	140
	Major H. H. Godwin-Austen.	In spirit.			
	H. L. Houghton, Esq.	"			
	Dr. Stoliczka.....	Skin in spirit.			
	Yunan Expedition...	In spirit ...			
	Do.	"			
	Do.	"	Types collected by Dr. Anderson	...	136
	Do.	"			
	Do.	"			
	Do.	"			
	Exchange, Berlin Museum.	"			
	Do.	"	.....	...	143
	Do.	"	.....	...	133

No.	Name.	Locality.	Date.
667	**Vespertilio blanfordi,** *Dobson*, ♂	Laching, Sikkim, at 8000 feet.	1871
668	" " " ♀	"	1871
669	" " " ♀	Simla	1871
670	" "	Darjeeling	1871
671	**V. nipalensis,** *Dobson*, ♀	Katmandu, Nipal	1871
672	**V. horsfieldii,** *Temm.*, ♀	Java	1872
673	**V. hasseltii,** *Temm.*, ♂	"	1872
674	**V. dasycneme,** *Boie*, ♀	Galicia	1872
675	**V. longipes,** *Dobson*, ♂	Caves of Bhima Devi	1872
676	" " ♂	Kashmir	1872
677	" "	"	1872
678	**V. murinoides,** *Dobson*	Chamba	1873
679	**Kerivoula hardwickii,** *Horsf.*, ♂	Java	.....
680	" " " ♂	Sibsaugor, Assam	.....
681	" " " ♀	.....	.....
682	" " " ♀	Unknown	.....
683	**K. picta,** *Pallas*	Jeypore	1852
684	" "	Ceylon	.....
685	" "	"	1851
686	" "	Java	1844
687	" " ♀	Calcutta	1869
688	? **K. lanosa,** *Smith*	Chaibasa	1842
689	" "	"	1842
690	" "	"	1842
691	" "	"	1842
692	**Harpiocephalus harpia,** *Pallas*, ♂	Darjeeling	1851
693	" " " ♂	"	1854
694	" " " ♀	Cherra Punji	1868
695	" " " ♂	Darjeeling	1872
696	**H. cyclotis,** *Dobson*, ♀	Unknown	.....
697	" "	"	.....
698	" " ♂	Darjeeling	1851
699	" "	"	1870
700	**H. suillus,** *Temm.*	Java	1871
701	**Plecotus auritus,** *L.*, ♀	Darjeeling	1851
702	" " "	England	1844
703	" " "	"	1844
704	" " "	France	1851
705	" " " ♂	Berlin	1851
706	**Synotus darjelinensis,** *Hodgs.*, ♂	Masuri	18
707	" " " ♀	"	18
708	" " " ♀	Darjeeling	18
709	" " " ♀	Laching, Sikkim, 8000 ft.	18
710	" " " ♀	Simla	18

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
667	W. T. Blanford, Esq.	In spirit.			
668	Do.	,,			
669	Moulvie Ataor Ruhman.	,,			
670	Captain Elwes	Dried skin	A dilapidated specimen.		
671	Museum Collector...	In spirit ...	(Type.)	...	141
672	Exchange, Berlin Museum.	,,	.....	...	128
673	Do.	,,	.....	...	126
674	Do.	,,	.....	...	129
675	Capt. W. G. Murray	,,	.....	...	131
676	Do.	,,			
677	Do.	Skeleton ...	Perfect.		
678	H. McL. Hutchison, Esq., H.M.'s 14th Regt.	In spirit ...	(Type.)	...	138
679	Exchange, Berlin Museum.	,,	.....	...	148
680	S. E. Peal, Esq.....	,,			
681	Do.	,,			
682	Unknown	,,			
683	J. Payter, Esq.	Dried skin	.....	109 B	146
684	Dr. Templeton	,,	.....	109 A	
685	Dr. Kelaart	,,	A mutilated specimen	109 C	
686	Batavian Institution	,,	.....	109 D	
687	Dr. J. Henderson ...	In spirit.			
688	Major S. R. Tickell	Dried skin	In very dilapidated condition	108 A	
689	Do.	,,		108 B	
690	Do.	,,		108 C	
691	Do.	,,		108 D	
692	Purchased	,,	In Blyth's catalogue *V. pearsonii*, Horsf.	106 A	155
693	W. Theobald, Esq...	Skeleton ...	A perfect skeleton prepared in 1872	106 B	
694	Major H. H. Godwin-Austen.	In spirit.			
695	W. S. Atkinson, Esq.	,,			
696	Unknown	,,	(Type.)	...	158
697	Do.	Skeleton ...	A perfect skeleton prepared in 1872.		
698	Major Sherwill	...	.....	107 A	
699	Captain Elwes	Dried skin	A mutilated specimen.		
700	Exchange, Berlin Museum.	In spirit ...	.....	...	152
701	Major Sherwill	,,	.....	114 A	84
702	Mr. Strickland and Mr. Davidson.	Dried skin	.....	114 B	
703	Do.	,,	.....	114 C	
704	M. Malherbe	,,	.....	114 D	
705	Exchange, Berlin Museum.	In spirit.			
706	Captain Hutton.....	,,	.....	116 A	86
707	Do.	,,			
708	Dr. J. Anderson ...	,,			
709	W. T. Blanford, Esq.	,,			
710	Moulvie Ataor Ruhman.	,,			

No.	Name.	Locality.	Date.
711	**Synotus darjelinensis,** *Hodgs.*, ♀	Simla	1872
712	**Nyctophilus geoffroyi,** *Leach*	Australia	1845
713	**Miniopterus pusillus,** *Dobson*, ♀	Nicobars	1871
714	,, ,, ,,	,,	1871
715	**M. schreibersii,** *Nat.*, ♂	North Italy	1872
715*a*	,, ,, ♂	Isagine, Upper Burma (Cave No. 11).	1875
715*b*	,, ,, ♂	,,	1875
715*c*	,, ,, ♂	,,	1875
715*d*	,, ,, ♂	,,	1875
715*e*	,, ,, ♂	,,	1875
715*f*	,, ,, ♂	,,	1875
715*g*	,, ,, ♂	,,	1875
715*h*	,, ,, ♂	,,	1875
715*i*	,, ,, ♂	,,	1875
715*j*	,, ,, ♂	,,	1875
715*k*	,, ,, ♂	,,	1875
715*l*	,, ,, ♂	,,	1875
715*m*	,, ,, ♂	,,	1875
715*n*	,, ,, ♂	,,	1875
	M. tristis, *Waterhouse*	Philippine Islands	.....
			Family
716	**Carollia brevicauda,** ♂	Trinidad	1876
717	**Artibeus perspicillatus,** *L.*, ♂	Demerara	1874
718	,, ,, ♀	,,	1874
			ADDE
719	**Scotophilus ornatus,** *Blyth*, ♂	Head of Iril river	1875
720	**Vesperugo abramus,** *Temm.*, ♂	Durrany, Assam	1875
721	,, ,, ,, ♂	,,	1875
722	,, ,, ,, ♀	,,	1875
723	,, ,, ,, juv. ♂	,,	1875
724	,, ,, ,, ♀	,,	1875
725	,, ,, ,, ♀	,,	1875
726	,, ,, ,, juv. ♀	,,	1875
727	,, ,, ,, juv. ♂	,,	1875
728	,, ,, ,, juv. ♂	,,	1875
729	**V. pipistrellus,** *Schr.*, ♂	Yangihissar	1875
730	,, ,, ♀	,,	1875
731	,, ,, ♀	,,	1875
732	,, ,, ♀	,,	1875
733	,, ,, ♀	,,	1875
734	,, ,, ♀	,,	1875
735	**Vesperus serotinus,** *Schr.*, ♂	Durrany, Assam	1875
736	**Vespertilio muricola,** *Hodgs.*, var. **blanfordi,** *Dobson*, ♀.	Murri	1875

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
711	Moulvie Ataor Ruhman.	In spirit.			
712	Sydney Institution...	Dried skin.			
713	Dr. Stoliczka	In spirit ...	Subspecies of *M. schreibersii*.....	...	162
714	Do.	Skeleton ...			
715	Exchange, Berlin Museum.	In spirit ...	.....	...	160
715*a*	Dr. J. Anderson ...	,,	Western-China Expedition, 1874. Fur intensely black throughout. Var. *M. blepotis*, Temm.		
715*b*	Do.	,,			
715*c*	Do.	,,			
715*d*	Do.	,,			
715*e*	Do.	,,			
715*f*	Do.	,,			
715*g*	Do.	,,			
715*h*	Do.	,,			
715*i*	Do.	,,			
715*j*	Do.	,,			
715*k*	Do.	,,			
715*l*	Do.	,,			
715*m*	Do.	,,			
715*n*	Do.	,,			
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716	G. E. Dobson, M.B.	In spirit.			
717	Do.	,,			
718	Do.	,,			

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719	Maj. H. H. Godwin-Austen.	In spirit ...	.....	...	124
720	Do.	,,	Collected during the Dufla Expedition, 1874.	...	97
721	Do.	,,			
722	Do.	,,			
723	Do.	,,			
724	Do.	,,			
725	Do.	,,			
726	Do.	,,			
727	Do.	,,			
728	Do.	,,			
729	Collected by the late Dr. F. Stoliczka during the second Yarkund Expedition in 1874.	,,	See pp. 216–17	...	95
730		,,			
731		,,			
732		,,			
733		,,			
734		,,			
735	Maj. Godwin-Austen.	,,	Dufla Expedition.		
736	Second Yarkund Expedition.	,,	Collected by Dr. Stoliczka	...	136

No.	Name.	Locality.	Date.
737	**Kerivoula picta,** *Pallas,* ♂	Dacca	1875
738	„ „ „ ♀	„	1875
739	**Plecotus auritus,** *L.,* ♂	England	1876
740	„ „ „ ♂♂	Leh	1875
741	„ „ „ ♂♂	„	1875
742	„ „ „ ♂♂	„	1875
743	„ „ „ ♀♀	„	1875
744	„ „ „ ♀♀	„	1875
745	**Synotus darjelinensis,** *Hodgs.,* ♀	Yangihissar	1875

No.	Donor.	How preserved.	Remarks.	No. in Blyth's Catalogue.	Index.
737	— Blisset, Esq.	In spirit.			
738	Do.				
739	G. E. Dobson, M.B.	,,			
740	Collected by Dr. Stoliczka during the second Yarkund Expedition.	,,			
741		,,			
742		,,			
743		,,			
744		,,			
745		,,			

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